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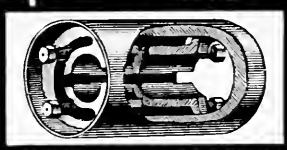

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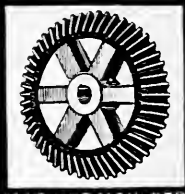

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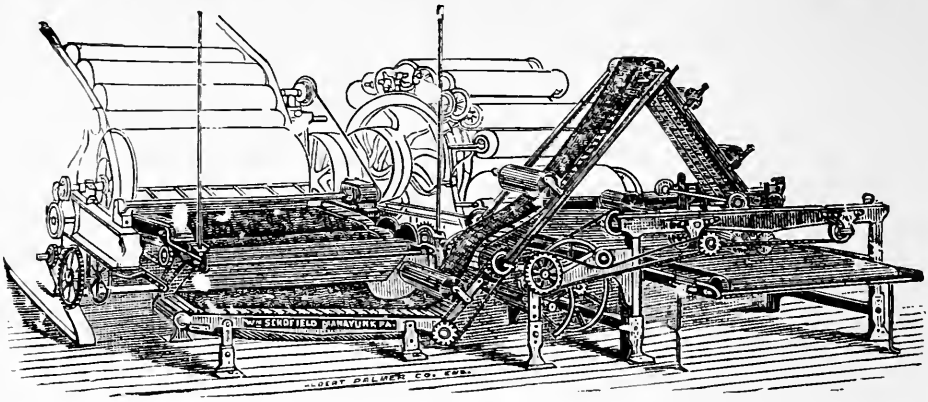

The accompanying engraving represents an improvement in Self-Feeds. I would particularly call your attention to the manner in which the Stock is deposited on the lower apron by means of a swinging frame. The Stock is carried from the doffer by a short apron, which deposits the same between two aprons that have a swinging motion, thus laying the Stock nice and even on the lower apron, and can be easily adjusted to any desired width. The Stock, by being deposited crosswise on the lower apron, is carried in that condition to the condenser table, and the fibre goes into the condenser comparatively straight.

Patented August 31, 1886. Patents Nos. 348,419, 348,420, 348,421, 351,531 and others applied for.

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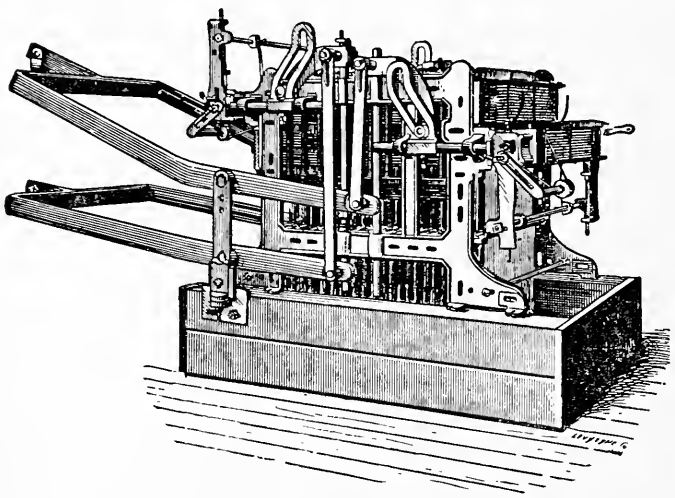

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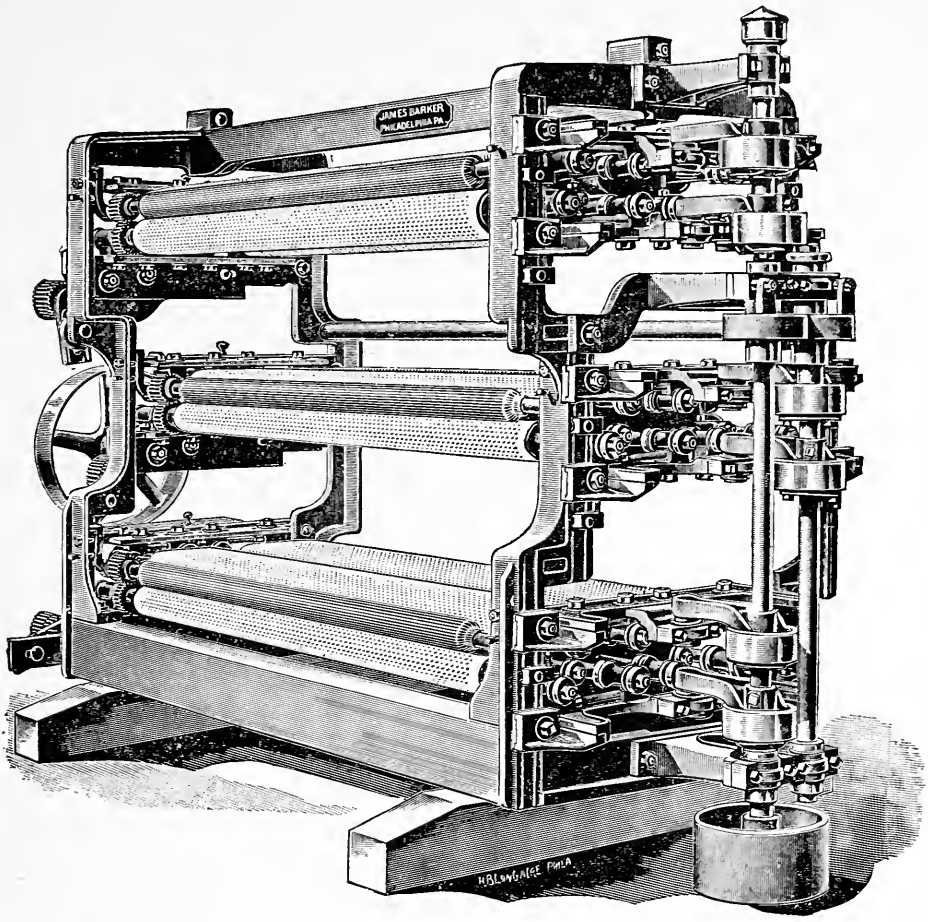

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2—Retains the advantages of the wire ring method of dividing the fleece.
3—Admits of width of ring being proportioned to the number of yarn.
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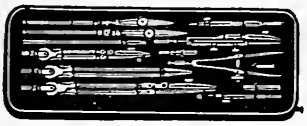

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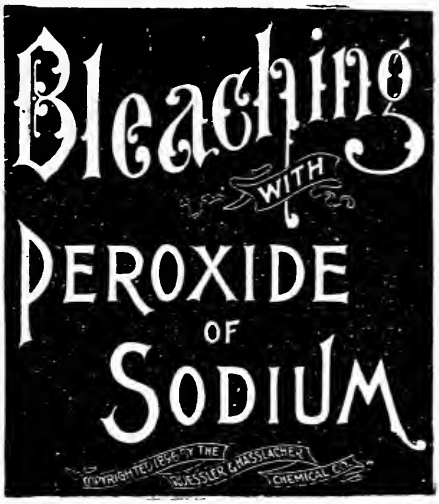

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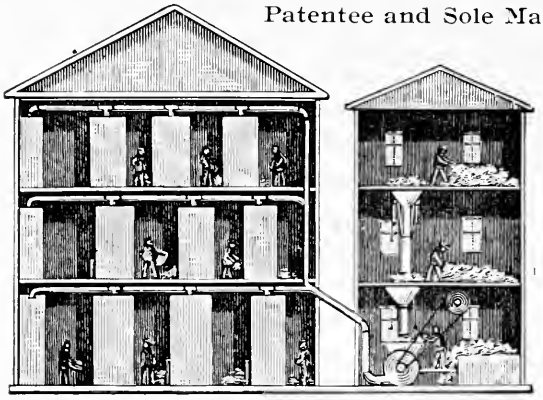

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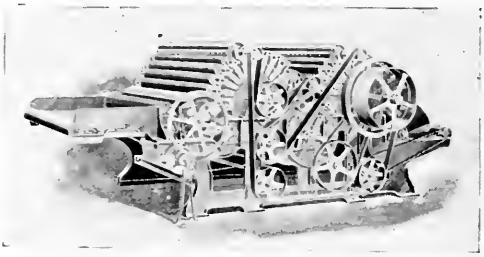

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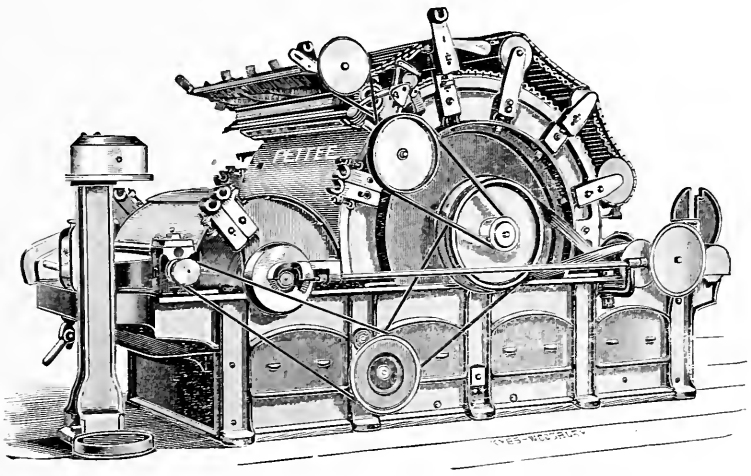

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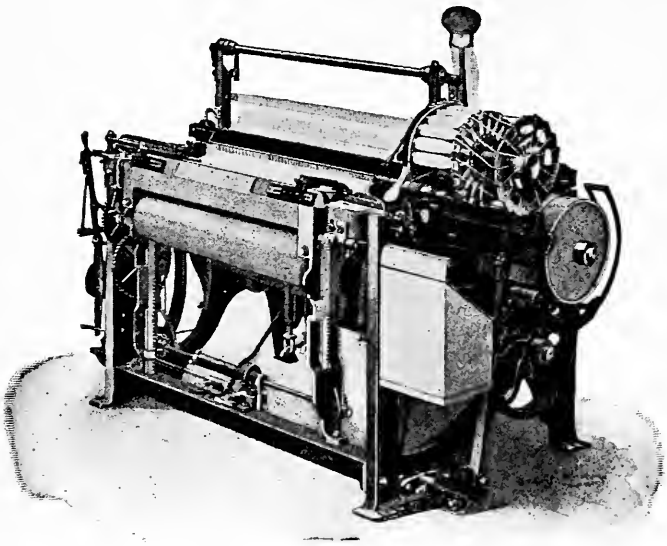

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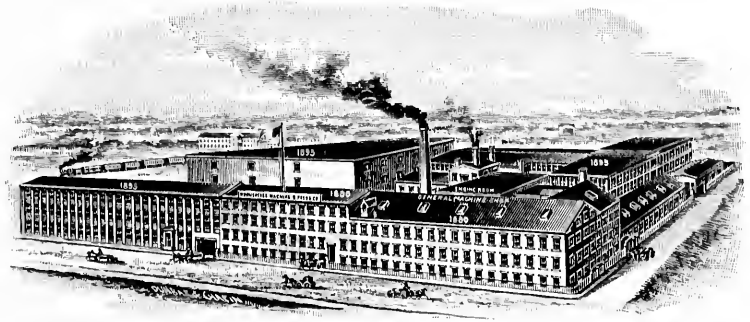

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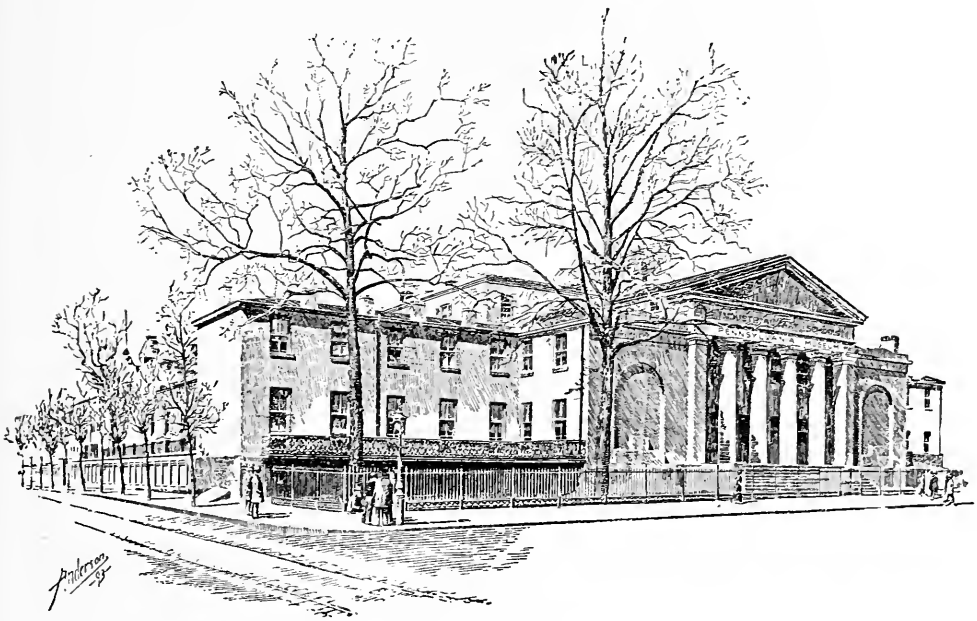

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Table of Contents.

Officers, Trustees and Committees 3, 4, 5
Calendar—School Year 6
Staff 7
Historical Sketch 9
Equipment 18
Courses of Study, Day School 26
Courses of Study, Evening School 69
Requirements for Admission 29
Free Scholarships 30
Fees 31
Payments 32
Deposits 33
Hours of Study 33
Examinations 35
Certificates and Diplomas 35
Honor Medals 36
Tools and Materials 37
Board 37
Subjects of Study, in detail—Day School 38
Subjects of Study, in detail— Evening School 74
Donations 78
Partial List of Former Students with the Occupation . . . 81

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OTTO SCHAUM, W. H. ROMETSCH, of Schaum & Uhlinger, Philadelphia, Manufacturers of Weaving Machinery for all kinds of Narrow Fabrics.

Calendar—School Year 1899–1900

SEPTEMBER

Thursday, 27th—Teachers present to explain courses and advise students of Day Classes.

Saturday, 30th—Examination for Admission to Day Classes.

OCTOBER

Monday, 2d—Sessions of Day Classes begin.

Wednesday, 4th, 7 P.M.—Registration of Students in Evening Classes.

Monday, 9th—Sessions of Evening Classes begin.
Saturday Class begins.

NOVEMBER

Thursday, Friday, Saturday, } Thanksgiving Holidays. School closed.

DECEMBER

Monday, 25th to Monday, January 1st } Christmas Holidays. School closed.

JANUARY

Tuesday, 2d—School re-opens.

FEBRUARY

Thursday, 22d—Washington's Birthday. School closed.

APRIL

Good Friday to Easter Monday, inclusive } Easter Holidays. School closed.

Friday, 13th—Sessions of Evening School end.

MAY

Wednesday, 30th—Memorial Day. School closed.

JUNE

Thursday, 7th—Annual Commencement and Exhibition.

Staff of the Textile School

L. W. MILLER,

Principal of the Schools of Industrial Art.

Lecturer on Historical Ornament and Principles of Design.

E. W. FRANCE,

Director of Textile School.

Lecturer on Raw Materials, Processes and Fabrics.

BRADLEY C. ALGEO, Assistant Director and Professor of Weave Formation—Analysis and Structure of Fabrics.

J. MERRITT MATTHEWS, PH.D., Professor of Chemistry and Dyeing.

CHARLES N. BUTLER, C.E., Lecturer on Patent Laws.

WILLIAM ROEBUCK, Instructor in Charge of the Weaving and Related Branches.

JOSEPH F. X. HAROLD, PH.D., Instructor in Chemistry.

J. M. WOELFEL, Instructor in Wet Finishing and Assistant Instructor in Dyeing.

JOHN F. SCOTT, Instructor in Charge of Cotton and Wool Carding and Spinning.

EDWARD J. ROBERTS, Instructor in Hand-Loom Department.

WILLIAM LAIRD TURNER, Instructor in Jacquard Design and Color Harmony—Evening Classes.

HELEN A. FOX, Instructor in Design and Color Harmony.

————————, Instructor in Free Hand Drawing and Design.

J. HARRY SHINN, Instructor in Jacquard Design and Application.

R. B. DOUGHTY, Instructor in Mechanical Drawing.

————————, Instructor in Worsted Drawing and Spinning.

F. M. JENNINGS, Instructor in Wool Grading and Sorting.

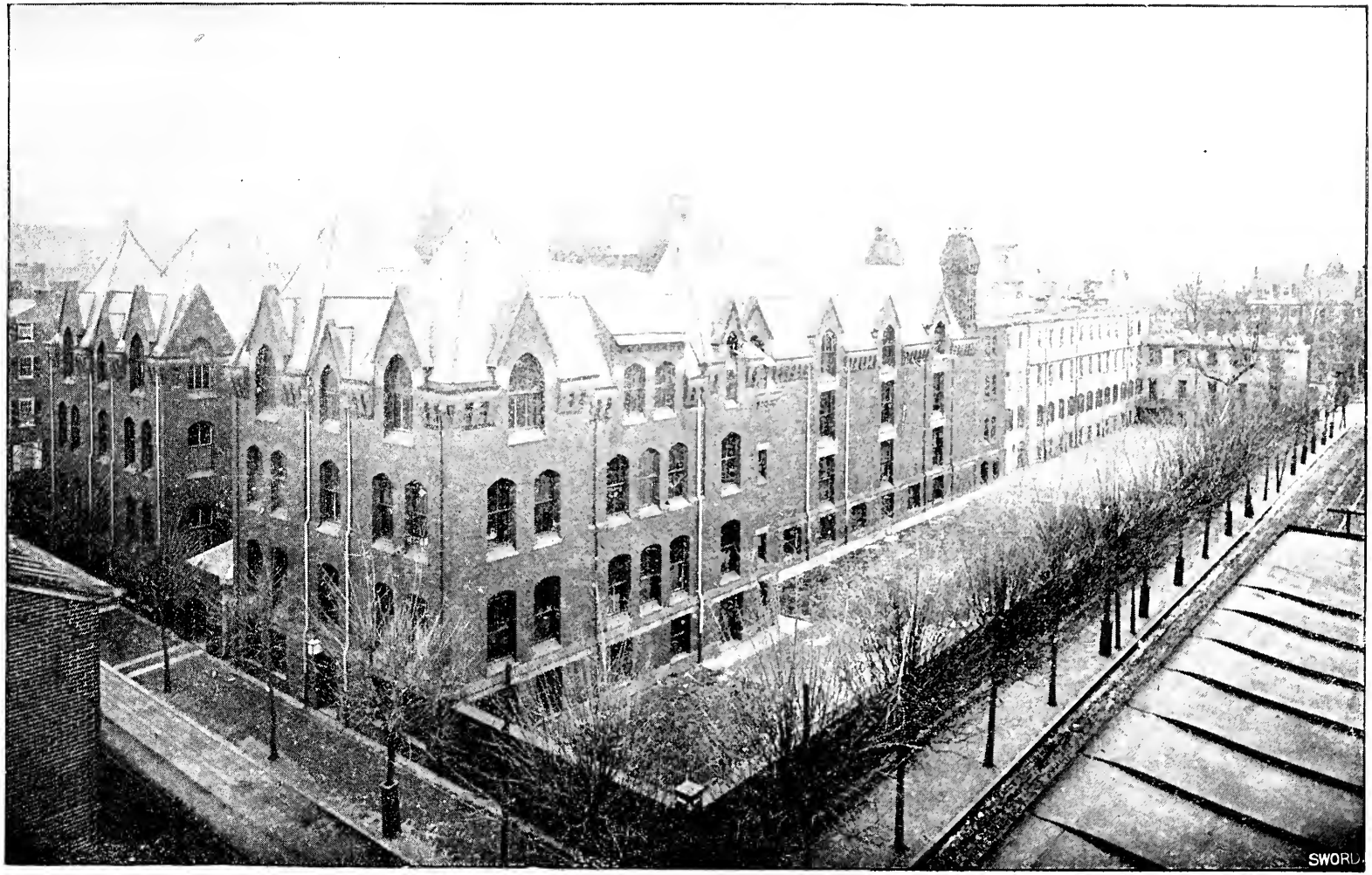
ALFRED BURHOUSE, Instructor in Dry Finishing.

A. M. GRILLON, Instructor in French, Italian and Spanish.

MADAME A. M. GRILLON, Instructor in German.

LEONORA J. C. BOECK, Registrar.

SAMUEL THOMPSON, JR, Superintendent of Building.


SWORD

Historical Sketch

of the

Pennsylvania Museum and School of Industrial Art

Origin and Purpose.

The Pennsylvania Museum and School of Industrial Art, an institution the origin of which was due to the increased interest in Art and Art Education awakened by the Centennial Exhibition, was incorporated on the twenty-sixth day of February, 1876, for the purpose, as stated in its charter, of establishing "for the State of Pennsylvania, in the City of Philadelphia, a Museum of Art in all its branches and technical applications, and with a special view to the development of the Art Industries of the State, to provide instruction in Drawing, Painting, Modelling, Designing, etc., through practical schools, special libraries, lectures and otherwise."

Location of Museum.

The purpose of the institution as thus defined is distinctly industrial. The collections at Memorial Hall, in Fairmount Park, where the Museum is located, embrace examples of art work of every description. It was determined by the founders to make the collections of the Pennsylvania Museum as largely as possible illustrative of the application of art to industry, and the instruction in the school has had constant reference to a similar purpose.

Source of Original Collection.

In the selection of objects, the trustees had the benefit of the advice of the foreign commissioners to the exhibition, and, in several instances, the institution was the recipient of valuable gifts from individual exhibitors, Around the nucleus thus formed, the Museum has grown

by purchase, gift and bequest to its present proportions, numbering in its collections upwards of ten thousand objects.

The major part of the collections of the products and manufactures of British India, shown at the Centennial Exhibition, was presented to the Museum by the British Government at the close of the Exhibition. It occupies the whole of the west corridor at Memorial Hall.

Recent Additions.

The Museum also possesses several special collections, sufficiently complete in themselves to be regarded as representative of the departments to which they belong. Of these the collection of American pottery, made by Mr. Edwin A. Barber; the collections of coins and medals, each of which is probably the most complete of any in America, the Caspar Clark collection of Persian Metal Work, the Vaux collection of Etruscan Pottery, the John T. Morris collection of Glass; a collection of Mediæval Wrought Iron and the collection of Textiles, are perhaps the most important.

Loan Collections.

In addition to its actual possessions, the Museum is constantly receiving accessions in the form of loans of a more or less permanent character, by which the element of freshness is secured, and popular interest in the collections continually renewed. The Museum is visited by about 400,000 persons a year.

Opening of the School.

The School was opened during the winter of 1877-78 in temporary rooms in Industrial Art Hall, at Broad and Vine Streets. It was removed in 1879 to the rooms of the Franklin Institute, at 15 South Seventh Street, and again, in 1880, to the building 1709 Chestnut Street, where it remained until its removal, in 1884, to 1336 Spring Garden Street.

Location of School.

The munificent gift of $100,000 by Mr. Wm. Weightman and the generous response of the public of Philadelphia to an appeal for assistance, by which a like

amount was raised by popular subscription during the spring of 1893, enabled the institution to acquire the magnificent property at the northwest corner of Broad and Pine Streets, which it occupies at present. This property, with a front of 200 feet on Broad Street and 400 feet on Pine Street, is by far the most spacious and most advantageous in its location of any establishment in America, that is devoted to the uses of a school of art, situated as it is on the principal street and in the very heart of the city.

First Courses of Study General only.

Up to the time of the removal to Spring Garden Street, the work of the classes was confined to the general courses in Drawing, Painting and Modelling, with constant regard to the needs of the industries, it is true, but without attempting to provide instruction in any of the occupations themselves.

The necessity of affording facilities for such technical instruction, however, became apparent very early in the history of the School. It was seen that only by familiarizing the students with the processes and industrial applications of design could the proper direction be given to such purely artistic training as the School had to offer.

Additions to the Curriculum.

The School of Applied Design, the School of Wood Carving, and the School of Textile Design and Manufacture, under the name of the Philadelphia Textile School, were accordingly organized in 1884. The Department of Chemistry and Dyeing was added to the School of Textile Design and Manufacture in 1887, and the Class in Interior Decoration was added as a department of the School of Decorative Painting in 1892, at which time the School of Architectural Design was also organized; the School of Modern Languages was established in 1893; the Departments of Wool Carding and Spinning and Cloth Finishing were added to the School of Textile Design and Manufacture in 1894 and that of Cotton

Carding and Spinning in 1896. A Department of Worsted Yarn Manufacture is in process of development, and under the present organization the following are in active operation :

Schools in Operation.

School of Drawing.
School of Applied Design.
School of Normal Instruction.

School of Textile Design and Manufacture, comprising the departments of Fabric Structure and Design, Weaving, Color Harmony and Figured Design, Chemistry and Dyeing, Wool Carding and Spinning, Worsted Drawing and Spinning, Cotton Carding and Spinning, and Finishing.

School of Woodwork and Carving.
School of Decorative Painting.
School of Illustration.
School of Decorative Sculpture.
School of Architectural Design.
School of Modern Languages.

The annual enrolment now amounts to about 900.

VIEW OF ONE OF THE ALCOVES IN DRAWING ROOM.

Philadelphia Textile School

The Philadelphia Textile School, as before noted, was organized in 1884. It represents the most important effort which has yet been made in America to organize the instruction in an Art School, with direct reference to its application to the actual needs of the Textile Industry.

The development and realization of this purpose were accomplished through the generous co-operation and support of the most energetic and influential members of the Philadelphia Textile Association.

Fostering Influences.

This Association, formed in 1882, had kept prominent among the objects for which it was created, the fostering of technical education. Its members represented the progressive element of the manufacturing community of Philadelphia and vicinity. These gentlemen were fully aware of the progress of technical schools for the textile arts in Germany, France and England, and were persuaded that the United States could not hope to maintain the best market for its products, unless these products combined the highest skill in manufacture, and best taste in design. At that time, no thorough school existed in this country, and it was necessary to begin at the foundation of the work, without previous knowledge of the exact methods to be adopted, or the means to be employed to reach the desired end.

Mr. Search's Initiative.

The initiative in this, as well as the work above described, was taken by Mr. Theodore C. Search, who was President of the Textile Association, as well as Vice-President and Chairman of the Committee on Instruction of the Pennsylvania Museum and School of Industrial Art. Indeed, he assumed at first the entire financial responsibility of organizing and equipping the Textile

School, and to his devoted and untiring service in its behalf, from its first inception to its present high state of development, more than to all other agencies combined, its success is due. That the Association took the action that it did was mainly due to the example and leadership of Mr. Search and of a few members who were, like him, fully alive to the importance of the movement, notably Mr. Thomas Dolan, Messrs. John and James Dobson, Mr. Wm. Wood, Mr. Wm. Arrott, Mr. John Yewdall, Messrs. Fiss, Banes, Erben & Co., Messrs. Conyers Button & Co., Messrs. George and James Bromley, Mr. Seville Schofield, Messrs. Alexander Crow & Son, Messrs. James Smith & Co., Messrs. M. A. Furbush & Son, Messrs. John Bromley & Sons, Mr. Thomas L. Leedom, Messrs. James Doak, Jr., & Co., Messrs. Charles Spencer & Co., Messrs. H. Becker & Co., Mr. Andreas Hartel, Mr. S. B. M. Fleisher, Messrs. Grundy Bros. & Campion, Messrs. H. W. Butterworth & Sons, and Messrs. Stead & Miller.

Support of Manufacturers

Official Approval.

The School has received the highest commendation in reports of the United States Government, of the Secretary of Internal Affairs of Pennsylvania, of the Textile Associations, and of individual manufacturers, who have also been liberal in its support and who eagerly seek its graduates, who go at once from the School into commanding positions in industrial establishments.

A Special Report of the Secretary of Internal Affairs of Pennsylvania says of it :

" It is an institution which is destined to reflect, to an increasing extent, credit upon its promotors and upon the State, and it represents more directly, perhaps, than any other single agency that could be pointed out, the most powerful influences which are being exerted to-day in shaping the industrial destiny of the Commonwealth."

The report of the Bureau of Education at Washington says :

The United States every year continue to pay millions to the superior artists and artisans of other countries. Every cent of this represents a foreign tax, voluntarily paid, simply in consequence of ignorance and want of skill. It is in the nature of tribute money formerly sent by subject to superior nations.

State and Federal Commendation.

"There was one direct contributiom to the instrumentalities for developing and extending art training in America which resulted from the Centennial Exhibition, and this was the Pennsylvania Museum and School of Industrial Art."

No more conclusive evidence is needed of the appreciation of the work of the School on the part of the men whose lives are devoted to the actual work of production than is furnished by the generous gift by the manufacturers, of the splendid equipment of machinery with which it is supplied and which is regarded by good authorities as the most complete set of apparatus possessed by any school in the world. That such things can be done at all through private liberality is the standing wonder of our relatives in Europe, where the most generous provision for all such instruction is regarded as one of the most pressing of public duties.

Approval of Practical Manufacturers.

The School was one of the two or three places which President McKinley visited during his recent visit to Philadelphia, and he expressed the heartiest approval of its aims and methods and great satisfaction which had resulted from what he was pleased to call the "splendid opportunities" offered by the School.

Visited by President McKinley.

Prof. N. Langowoj, Director of the Government Technical School in St. Petersburg, said that the School of Industrial Art was the most interesting thing he had seen in America, and that he should have felt well paid if he had made the journey from Russia for the sole purpose of visiting it.

Mr. Edward Martin, Commissioner of Education in

Foreign Interest and Approval.

France, said: "We have no schools in France doing work of the excellence and variety which distinguishes the work of this school."

M. Jules Steeg, Inspector-General of Education in France, and Prof. Lemcke, Director of the Royal Textile School of Crefeld in Prussia, E. Henry Reiter, Commissioner from Switzerland to examine into the progress of industries in America, and many others, speaking with almost if not quite equal authority, have borne similar testimony to the quality of the work accomplished by this School.

National Association of Manufacturers

The following resolutions were adopted by the National Association of Manufacturers at the Philadelphia Convention, January, 1897:

"This Association, having visited in a body the School of Industrial Art of the Pennsylvania Museum and inspected its various departments, desires to place on the minutes of the proceedings of this convention an expression on the part of the convention of gratification in finding so extensive and well-equipped a technical school; of the high character of its results as shown in the finished work of the students, and its endorsement of its plan, purpose and scope.

"We recognize in this School a most powerful factor for producing from the ranks of our youth earnest, industrious and intelligent citizens, whose influence will be to strengthen the State.

"We congratulate our President, Mr. Theodore C. Search, upon his connection with and support of this School, and wish him Godspeed in his noble and philanthropic work."

Adopted by the New England Cotton Manufacturers' Association at its fall meeting, held in Philadelphia, October, 1897:

"*Resolved*, That this Association has studied with the greatest interest the work of the Pennsylvania Museum and School of Industrial Art, including the

Philadelphia Textile School, and desires to record in this way its high appreciation of the important service which this institution is rendering to the cause of American industrial development.

New England Cotton Manufacturers' Association.

"We feel that among the agencies which it is the worthiest aim of such associations as ours to promote and support, industrial education is of the first importance, and we warmly commend the spirit in which this magnificent School is conducted and the methods which characterize its teaching.

"*Resolved*, That no better use can be made of public funds, of private munificence, or of the power that results from association, than in the most liberal support of such institutions as the PENNSYLVANIA MUSEUM AND SCHOOL OF INDUSTRIAL ART."

Desiring to leave with the School some memorial that would worthily and permanently testify to the interest and appreciation, so well expressed in the above resolutions, the Association has caused to be executed and erected on a pedestal of polished granite, suitably inscribed, a bronze bust of the late George Draper, Esq., whose life and career as an ingenious inventor, a successful manufacturer, and a public-spirited citizen, so well represent the ideals of the Association and the lesson for whose enforcement the School of Industrial Art exists.

Equipment

The School can now lay claim to an equipment excelling that of any similar institution. The numerous machines and appliances have been added from time to time as their necessity became apparent. Wherever it was seen that a new apparatus would assist in the demonstration of a subject, that apparatus was obtained, and where an improvement was made in machinery already in the School, either that improvement was attached or the old machine was replaced by an entirely new one. In this manner the institution has kept apace with the development of the times, and we feel assured that but a glance at the appended list will reveal the opportunity for practical instruction which is afforded.

WOOL STOCK PREPARING.

One wool-scouring box.
One rinse box.
One hydro-extractor.
One cold air wool dryer.
One William Schofield 42-inch willow.
One 24-inch C. G. Sergent Sons burr picker.
One William Schofield 30-inch wool-mixing picker.

WOOL CARDING AND SPINNING.

One set of M. A. Furbush & Son Machine Co. 48-inch wool cards, consisting of first breaker, second breaker, and finisher, equipped with the Kay rub motion. The above cards clothed by the American Card Clothing Co., Worcester, Mass.)

One set of Gessner 60-inch wool cards, consisting of first breaker (with side drawing, made by the Atlas Machine Co., Newark, N. J.), second breaker, and finisher, with strap-dividing condensers.

Two Bramwell feeders for above cards, made by Geo. S. Hardwood & Son.

One 60-inch M. A. Furbush & Son Machine Co. floor traverse grinder, complete.

One 48 inch B. S. Roy traverse grinder.

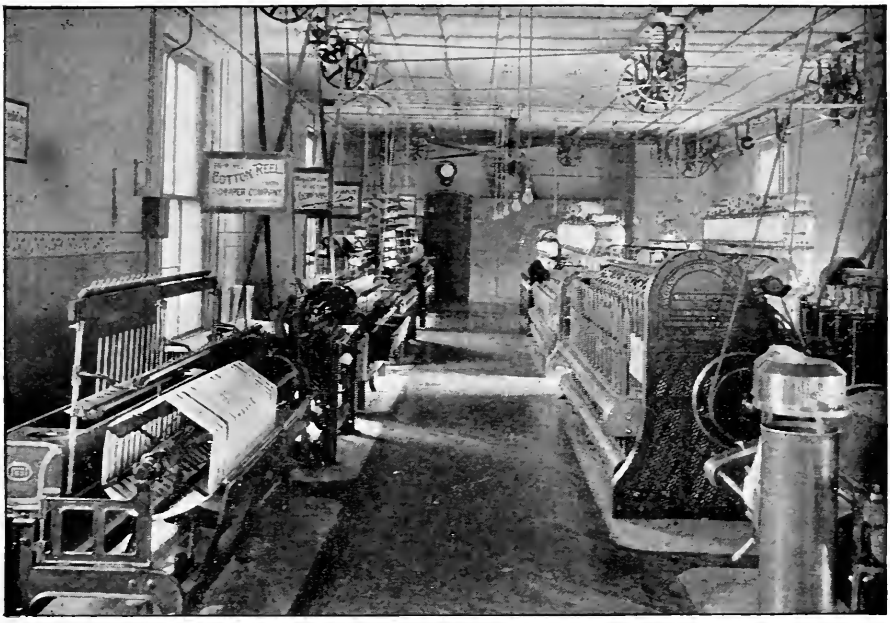
One 400 spindle M. A. Furbush & Son Machine Co. self-acting mule for wool.

Three Gessner spinning frames.

One Clarence W. Arnold card clothing machine for fillet.

WORSTED DRAWING AND SPINNING.

One coiler gill box. One double can gill box. One 2 spindle gill box. Two 2 spindle drawing boxes. One 4 spindle weigh box. One 8 spindle finisher. One 24 spindle reducer. One 30 spindle dandy rover. Two 72 spindle cap spinning frames. One 72 spindle two and more fold ring twister. The above machines, constituting the equipment in this branch, were made by the Lowell Machine Shop, Lowell, Mass.



COTTON CARDING, DRAWING AND SPINNING.

COTTON CARDING AND SPINNING.

One Pettee Machine Co. 40-inch latest improved revolving top flat card (110 flats) and coiler.

One Pettee Machine Co. latest improved railway head and coiler, single delivery, metallic top rolls.

One Pettee Machine Co. latest improved drawing frame, four deliveries, metallic top roll.

One Woonsocket Machine and Press Co. 32 spindle slubbing frame, with Daly's improved differential motion.

One Woonsocket Machine and Press Co. 42 spindle intermediate roving frame, with Daly's improved differential motion.

One Woonsocket Machine and Press Co. 64 spindle fly frame, with Daly's improved differential motion.

One Fales & Jenks 80 spindle, 1⅝-inch ring, 2¾-inch gauge, 6-inch traverse warp spinning frame, equipped with Doyle and Rhoades-Chandler separators and kink arresters.

One Fales & Jenks 80 spindle, 1 3/8-inch ring, 2 3/4-inch gauge, 6-inch traverse filling spinning frame, with kink arresters.

One Fales & Jenks 60 spindle, 2 1/2-inch ring, 3 1/2-inch gauge, 6-inch traverse ring twister, arranged to twist up to 4-ply, and constructed to twist either wet or dry.

One Whitin Machine Co. 80 spindle, 1 1/2-inch ring, 2 3/4-inch gauge, 5 1/2-inch traverse combination warp and filling wind spinning frame, with Whitin automatic separators.

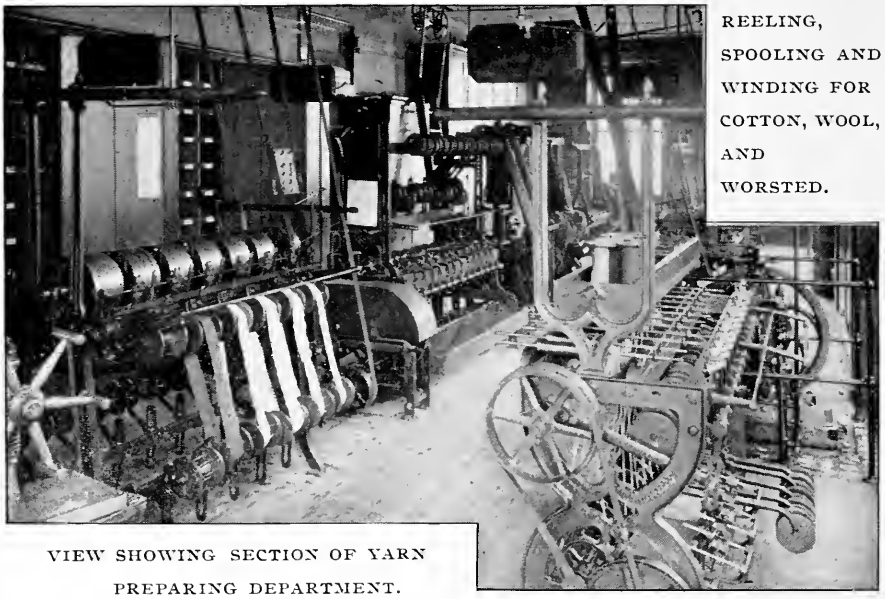
The following from the Pettee Machine Co. :

One 40-inch traverse grinder for cylinder and doffer.

One 40-inch oscillating roller grinder for grinding flats.

One 40-inch burnishing roll for cylinder and doffer.

One 40-inch stripping roll for cylinder and doffer.



VIEW SHOWING SECTION OF YARN PREPARING DEPARTMENT.

REELING, SPOOLING AND WINDING FOR COTTON, WOOL, AND WORSTED.

COTTON, WOOL AND WORSTED SPOOLING AND WINDING.

One W. W. Altemus & Son presser spooler.

One 32 spindle Easton & Burnham upright spooler.

One 25 spindle 54-inch Draper combination yarn reel.

One 12 spindle Fairmount Machine Co. bobbin winder.

One 12 spindle W. W. Altemus & Son bobbin winder with improved variable motion.

One 12 spindle W. W. Altemus & Son cop winder.

One Lindsay, Hyde & Co., improved wool yarn reel.

One A. W. Allen cop winder for carpet yarns.

One 12 spindle Collins Bros. ring twister for coarse yarns.

One 12 spindle Collins Bros. ring twister for fine yars.

Six hand quill winders.

One 40 end section spooler.

SILK REELING, WINDING AND WARPING.

One reel with copper pan and copper table tinned over.
One extra reel.
One 20 spindle Atwood Machine Co. silk quiller.
One Atwood Machine Co. soft silk skein winder.
Two Schaum & Uhlinger quill winders for silk.
One Atwood Machine Co. warper and creel for silk.
One Atwood Machine Co. beamer for silk.

COTTON, WORSTED AND WOOL WARPING AND BEAMING.

One T. C. Entwistle chain beamer.
One section warper and creel for ingrain carpet.
One upright warper and creel.
Six pin warping frames and creels for sample warps.
Five beaming frames.
One Lowell Machine Shop drawing-in frame.

HAND WEAVING.

Cotton and Union Fabrics.

Twelve 30 harness 4 x 4 box looms for fancy cottons.

Six 30 harness 4 x 4 box looms (Unions).

Worsted and Woolen Work.

Twelve 30 harness 4 x 4 box looms for worsteds.

Six 24 harness 4 x 4 box looms for fancy cassimere.

Eight 30 harness 4 x 4 box looms for fancy dress goods.

Jacquard and Special Work.

One 200 machine tied up for narrow fabrics, coat labels, shoe pulls, etc., mounted on a plain loom with swivel batten.

One 200 machine tied up for damask, etc., mounted on a 4 x 4 box loom.

One 400 machine tied up for petit-point upholstery goods, mounted on a 4 x 4 box loom.

One 200 machine tied up for satin-faced upholstery goods, mounted on a 4 x 4 box loom.

One 400 machine tied up for double cloth cloakings.

One 400 machine tied up for rugs, mounted on a 3 x 3 box loom.

One 600 machine tied up for novelties, mounted on a 4 x 4 box loom.

Silk and Special Fabrics.

Two 24 harness 4 x 4 box.

One 600 Jacquard loom tied up for brocade work.

One 26 row ingrain carpet loom.

Two 20 harness looms for guimpes and trimmings.

One high cam loom for fancy fringes.

POWER WEAVING.

Looms for Cotton Fabrics.

One George W. Stafford Mfg. Co. light cotton loom, with 20 harness, double acting dobby and 1 x 1 box.

One Fairmount Machine Co. roller loom, with 4 x 1 box and multiplier.

One Knowles gingham loom, with 7 x 1 box and multiplier.

One Crompton gingham loom, with 6 x 1 box and multiplier.

Two Northrop looms, with warp stop motion and automatic filling magazine, made by Geo. Draper & Sons.

One Whitin loom, with 4 x 1 box and George W. Stafford Mfg. Co. 400 hook raise and drop Jacquard machine.

One Bridesburg clipper loom, with 1 x 1 box and Thomas Halton 600 hook double cylinder, double lift Jacquard machine.

Two Keighley 40-inch reed space looms, 1 x 1 box, 6 harness capacity, side cams.

One Knowles light fancy cotton loom, 4 x 1 box, with 20 harness, dobby and harness chain multiplier arrangement.

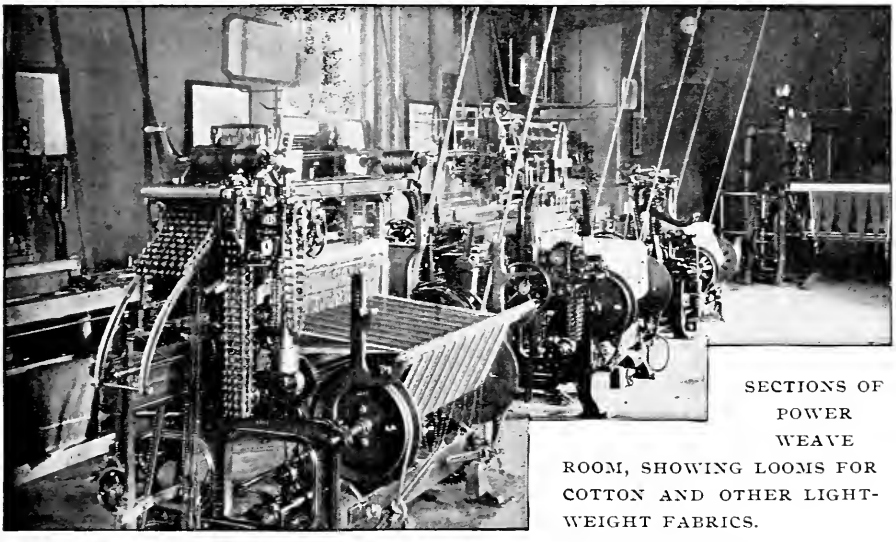
One Knowles latest improved 2 frame Lappet loom, with 20 harness, dobby and Leno motion.

Looms for Woolen and Worsted Cloths.

One Knowles fancy worsted loom, 30 harness, 48-inch reed space, double beam, 4 x 4 box.

One Crompton closed shed fancy cassimere loom, 27 harness, 48-inch reed space, double beam, 4 x 4 box.

One Crompton improved fancy worsted and woolen loom, 27 harness, 48-inch reed space, double beam, 4 x 4 box.



SECTIONS OF POWER WEAVE ROOM, SHOWING LOOMS FOR COTTON AND OTHER LIGHT-WEIGHT FABRICS.

One Knowles light fancy loom, "Gem," 16 harness, 40-inch reed space, 4 x 4 box.

One Fairmount Machine Co. light fancy loom, 20 harness, 4 x 1 box.

Three Keighley 40-inch reed space looms, with 20 harness Ingraham dobbies, 1 x 1 box.

Looms for Ingrain Carpets.

One M. A. Furbush & Son Machine Co. Murkland high speed loom, with fifth box attachment.

One Crompton latest improved loom, 4 x 4 box.

One Knowles latest improved loom, 4 x 4 box.

Looms for Silk and Special Fabrics.

One Knowles fancy silk loom, 30 harness, double beam, 35-inch reed space, 4 x 4 box.

One Schaum & Uhlinger silk loom, 4 x 4 box, with 600 hook rotary cylinder Jacquard machine.

One Knowles silk loom, 4 x 4 box, with 1,200 hook Schaum & Uhlinger Jacquard machine.

One Schaum & Uhlinger swivel loom for light dress goods and draperies, 1 x 1 box, with 400 hook Schaum & Uhlinger Jacquard machine.

One Knowles broad upholstery loom, 72-inch reed space, 4 x 4 box, 600 hook Schaum & Uhlinger Jacquard machine.

One Schaum & Uhlinger ribbon loom, 24 harness, side Jacquard and side cams, single battens, six widths.

One side cam loom for elastic webbing.

One Crompton fancy silk loom, 20 harness, double beam, 35-inch reed space, 4 x 4 box, with harness chain multiplier.

JACQUARD CARD-CUTTING.

One Schaum & Uhlinger, American Index, foot-power card-cutter for ingrain carpet.

One Schaum & Uhlinger, French Index, foot-power card-cutter for 200, 400 or 600 hook machines.

One Schaum & Uhlinger, French Index, power card-cutter for 200, 400 or 600 hook machines.

One John Royle, French Index, foot-power card-cutter for 200, 400 or 600 hook machines.

Three card lacing frames.

Two side Jacquard punching plates.

CHEMISTRY.

The rooms in which this branch is carried on are admirably fitted up with individual desks for the students, each being supplied with gas and water and the necessary apparatus. Fine balances, sensitive to the tenth of a milligramme, are provided for the accurate weighing of small quantities which are used in the various tests.

DYEING.

The instruction in dyeing is not only carried on experimentally in the laboratory, but a more practical knowledge is derived from the use of the larger machinery in the dye-house, which consists of :

Six tubs of regulation depth, supplied with steam and water and arranged for either skein or piece dyeing.

Three tubs, supplied with steam and water, for sample lot dyeing.

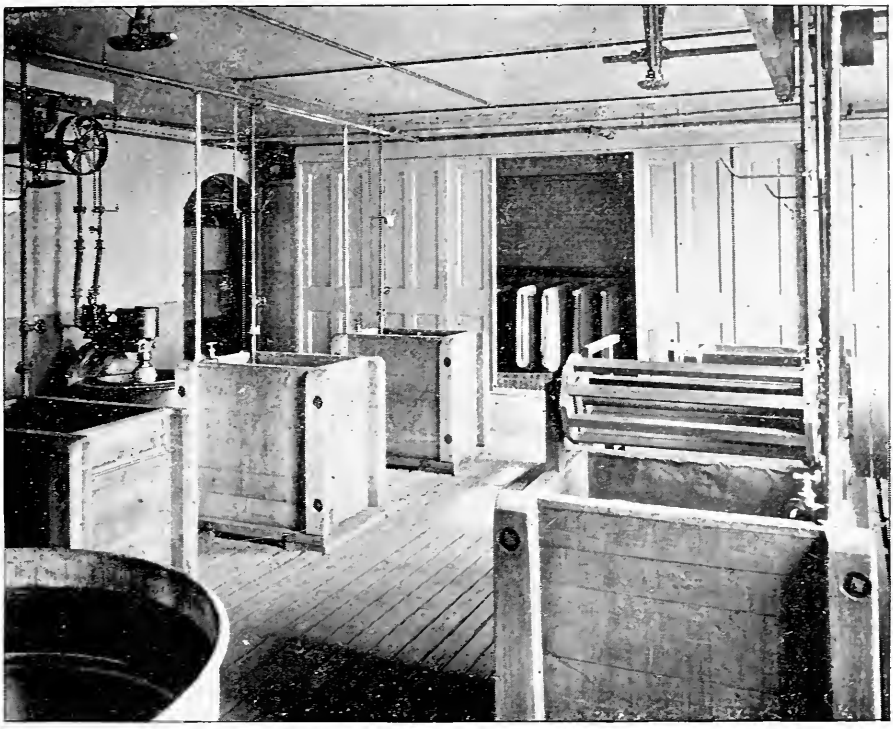
One large copper kettle, supplied with water and steam, for raw stock scouring and dyeing.

One copper kettle for soap-making.

One Granger Machine Co. jigg dyeing machine.

One Schaum & Uhlinger self-balancing, top engine driven, hydro extractor.

One drying room well heated and ventilated.



A VIEW IN SKEIN YARN AND PIECE-GOODS DYE HOUSE.

FINISHING DEPARTMENT.

One James Hunter Co.'s rotary fulling mill and washer combined.

One Gessner improved push fulling mill, with lateral side movement.

One Curtis & Marbel single cylinder upright gig.

One Parks & Woolson cloth shear, with patent listing motion.

One Gessner improved rotary cloth press.

One David Gessner double cylinder cloth brush.

One Morris & Tasker hydro-extractor.

Courses of Study—Day School

REGULAR COURSE.

This course, which is the development of fifteen years of active, thoughtful work in Textile Education, is strongly recommended to all, particularly on account of its scope, tending, as it does, to overcome for the individual the narrowness of knowledge which is apt to result from division of labor and specialization in industry. The keen competition of the present day has placed a premium on the man whose knowledge is broad, and it is in realization of this fact that the Regular Course has been arranged to give full instruction in Cotton, Wool, Worsted and Silk yarns and fabrics. The person following this course is enabled on its completion to enter any of the mentioned branches of the industry, and by his knowledge of the others recognize good features in them and adapt these good features to his own fabrics. Three years are required to complete this course, and the subjects of study include:

First Year.

Weave Formation.—Analysis and Structure of Fabrics.—Color Harmony.—Free Hand Drawing and Principles of Figured Design.—Mechanical Drawing.—Jacquard Design.—Warp Preparation and Weaving.—Chemistry.—Carding and Spinning.—Miscellaneous Lectures.

Second Year.

Weave Formation.—Analysis and Structure of Fabrics.—Color Harmony.—Jacquard Sketching and Design.—Wool and Worsted Spinning.—Machine Drawing.—Warp Preparation and Weaving.—Chemistry.—

Dyeing.—Wool and Worsted Cloth Finishing,—Miscellaneous Lectures.

THIRD YEAR.

Weave Formation.—Analysis and Structure of Fabrics.—Color Harmony.—Jacquard Sketching and Design.—Spinning, Wool, Worsted or Cotton.—Warp Preparation and Weaving.—Chemistry.—Dyeing.—Worsted and Woolen Cloth Finishing.—Miscellaneous Lectures.

NOTE.—For detail of preceding subjects see page 38.

COTTON COURSE.

FIRST YEAR.

Weave Formation.—Analysis and Structure of Fabrics.—Color Harmony.—Free Hand Drawing and Principles of Figured Design.—Mechanical Drawing.—Jacquard Design.—Carding and Spinning.—Machine Drawing.—Warp Preparation and Weaving.—Chemistry.

SECOND YEAR.

Weave Formation.—Analysis and Structure of Fabrics.—Warp Preparation and Weaving.—Color Harmony.—Jacquard Sketching and Design.—Carding and Spinning.—Dyeing.

NOTE.—For detail of preceding subjects see page 49.

WOOL AND WORSTED COURSE.

FIRST YEAR.

Weave Formation.—Analysis and Structure of Fabrics.— Chemistry. — Color Harmony. — Mechanical Drawing.—Principles of the Jacquard Machine.—Wool and Worsted Spinning.—Warp Preparation and Weaving.

SECOND YEAR.

Weave Formation.—Analysis and Structure of Fabrics.—Color Harmony.—Wool and Worsted Spin-

ning.—Machine Drawing.—Warp Preparation and Weaving.—Dyeing.—Woolen and Worsted Cloth Finishing.

NOTE.—For detail of preceding subjects see page 53.

SILK COURSE.

FIRST YEAR.

Weave Formation.—Analysis and Structure of Fabrics.—Color Harmony.—Free Hand Drawing and Principles of Figured Design.—Mechanical Drawing.—Jacquard Design.—Warp Preparation and Weaving.—Chemistry, and Miscellaneous Lectures.

SECOND YEAR.

Weave Formation.—Analysis and Structure of Fabrics.—Color Harmony.—Jacquard Sketching and Design.—Warp Preparation and Weaving.—Chemistry.—Dyeing, and Miscellaneous Lectures.

NOTE.—For detail of preceding subjects see page 60.

CHEMISTRY AND DYEING COURSE.

The course in Chemistry and Dyeing covers a period of two years, and is calculated to fit the student to know when a dyeing plant is properly administered. Instruction is given in a practical way, and the student learns to know the dyeing powers and the commercial values of the various dyestuffs and chemicals used in dyeing establishments. His eye is trained in color matching, and the chemistry of the subject is entered into thoroughly, so that the student may test and know the real values of prospective purchases of chemicals and dyestuffs.

INGRAIN CARPET COURSE.

In this course one year is devoted to Ingrain Designing, together with the study of the machine and the effects produced by it.—Card Cutting and Weaving.

NOTE.—For further details see page 68.

EVENING SCHOOL COURSES.

For subjects of study see page 69.

LECTURES.

In addition to the lectures in the regular course of instruction, including those on Patent Law, outlined on page 68, others are given from time to time on various topics bearing directly on the Textile Industries by various well-known men of the country. The names of these lecturers, their subjects and the dates of their lectures will be announced later.

NEW FEATURES.

Options in Modern Language.

Pupils registered in any of the regular day classes have the privilege of two lessons per week in one language at no additional expense for tuition.

Worsted Spinning.

During the past year a complete Worsted Drawing and Spinning plant has been duly installed for the production of worsted yarns, thus establishing a department in this line similar to the departments of wool and cotton.

REQUIREMENTS FOR ADMISSION.

It is exceedingly desirable that students should possess considerable proficiency in free hand drawing on entering the School, but opportunities for acquiring this proficiency in our elementary schools are so limited and the preparation in this respect, of the great majority of applicants who are otherwise well qualified, is consequently so imperfect, that insistence upon any standard of admission in this most important branch has been found to be impracticable. All students, and those who contemplate becoming such, are, however, reminded of the fact that proficency in drawing is one of the most essential and indispensable requisites to success in Textile Design, and those whose preparation in this respect has been inadequate are earnestly advised to supplement

the regular instruction of the Textile School, by availing themselves of the excellent opportunities afforded by the evening drawing classes of the School of Applied Art, which is located in another wing of the School building. Applicants are also expected to be as well versed in the common English branches as the completion of the ordinary grammar school course would imply, and will be expected to pass an examination in Arithmetic (through percentage).

SCHOLARSHIPS.

In consideration of an annual appropriation to the School by the Legislature of Pennsylvania, each county in the State is entitled to at least one free scholarship in any department of the School for the full course of three years. Counties sending more than one Senator to the Legislature are entitled to as many scholarships as there are Senatorial districts. These appointments are made by the Governor of the State, usually on the recommendation of members of the State Legislature.

Five free scholarships are also competed for annually by pupils from the graduating classes of the grammar schools of the city of Philadelphia. Application for admission to this competition should be made through the Principal of the School from which the applicant comes to the Board of Public Education. Two scholarships are also offered to each of the following Public Schools of Philadelphia: The Central High School, the Central Manual Training School, the Northeast Manual Training School, the Girls' High School, the Girls' Normal School, and the Public Industrial Art School. One of these scholarships for the day class is awarded annually to a graduate of the school in question, and one, for the evening class, is awarded to a pupil still in attendance at the Public School.

A certain number of free scholarships have also been provided by the bequest of Mr. Joseph E. Temple and by gifts for this purpose by Mrs. Susan R. Barton, Mrs. William Weightman, Jr., Mrs. Chapman Biddle and Mrs. Frederic W. W. Graham. These are awarded by the Committee on Instruction after satisfactory evidence has been furnished of the applicant's ability and earnestness of purpose. Any of the above scholarships are subject to recall at any time if, in the judgment of the Principal, the progress of the holder is unsatisfactory.

A student who fails to attend regularly or to do the work of his class receives notice to this effect and is warned that unless a marked improvement is shown at once the scholarship will be declared vacant.

He is usually given one month after the date of such notice in which to show that the warning has been heeded and has produced the desired effect. If, however, at the expiration of this time his progress still continues to be unsatisfactory, he is notified that the scholarship has been forfeited.

TUITION FEES AND OTHER EXPENSES.

Regular Course.

Day School (see page 26), $150.00 per year of thirty-six weeks.—(See "Deposits," page 33, and "Tools and Materials," page 37.)

Cotton Course.

Day School (see page 27), $150.00 per year of thirty-six weeks.—(See "Deposits," page 33, and "Tools and Materials," page 37.)

Wool and Worsted Course.

Day School (see page 27), $150.00 per year of thirty-six weeks.—(See "Deposits," page 33, and "Tools and Materials," page 37.)

Silk Course.

Day School (see page 28), $150.00 per year of thirty-six weeks.—(See "Deposits," page 33), and "Tools and Materials," page 37.)

Chemistry and Dyeing Course.

Day School (see page 28), $150.00 per year of thirty-six weeks.—(See "Deposits," page 33), and "Tools and Materials," page 37.)

Ingrain Carpet Course.

Day School (see page 28), $75.00 per year of thirty-six weeks.—(See "Deposits," page 33, also "Tools and Materials," page 37.)

Modern Language Course.

Day School, two lessons a week in one Language, $12.00 per season of eight months. This fee is remitted in the case of pupils registered in any one of the regular day classes of the Textile School.

Evening School.

Fees for either one of the Evening School Courses, with the exception of the General Analysis and Technical Chemistry, as mentioned on page 69, is $15.00.—(See "Deposits," page 33.) General Analysis and Technical Chemistry, $25.00.—(See "Deposits," page 33.)

All fees are payable in advance.—Students' tickets are issued on the payment of fees, and students will not be permitted to enter any class until the fees have been paid and the ticket obtained. Persons who desire to reserve a place in a class by entering before the opening day may either pay the whole fee or make a partial payment of $25.00, the balance being payable as above. Fees once paid will in no instance be refunded, except by special action of the committee.

DEPOSITS.

Day Students.

Students in the Day School are required to make a deposit of $15.00. Of this amount, $2.50 in the case of students of First Year Classes and $5.00 in the case of students of Advanced Classes are retained to partly cover the cost of materials consumed. After deducting this amount and those due for breakage and laboratory charges, the balance is returned at the end of the school year. In the case of a student whose course does not include Chemistry or Dyeing, the deposit will be $10.00.

Evening Students.

Students in the Evening Courses in Elementary Chemistry or Dyeing make a deposit of $5.00 to cover breakage and laboratory charges. For students taking the Advanced Courses in Chemistry this deposit is $10.00. After deducting such charges the balance is returned at the close of the school session.

Locker Deposits.

Students of the Day School also make a deposit of $2.00 for a locker key, of which amount fifty cents is refunded upon the return of the key, the balance, $1.50, being retained as rental for the use of the locker. Keys will not be redeemed unless presented within thirty days after the close of the current school year. Students of the Regular Textile Evening School make a deposit of one dollar when they are supplied with a locker. Fifty cents of this amount is refunded, provided the key is returned within thirty days after the close of the school year.

HOURS OF STUDY.

Day Classes.

The hours of study for the Day Classes are from 9 A.M. until 12 M., and from 1 P.M. until 4 P.M., every

week day except Saturday. On Saturday the session is from 9 A.M. until 12 M.

The Second Year Regular, Second Year Wool and Worsted, and the Third Year Regular Day Classes are also required to attend the course of lectures on Cloth Finishing and those on Wool Selecting, Grading, Sorting, Blending, etc., in accordance with announcements made during the year. (See page 76 and 77.)

All Classes in Modern Languages meet after 4 P.M.

Evening Classes.

The Evening Classes are in session from half-past seven until half-past nine on Monday, Wednesday and Friday evenings.

DISCIPLINE.

The organization and discipline of the School require strict observance of the following: Punctual and regular attendance, polite and orderly conduct, and the return of all tools, materials and apparatus to their proper places before leaving the class rooms. A serious breach of any of the foregoing will be considered sufficient grounds for dismissal without remission of fees. The disposition on the part of any student to enter other class rooms than his own, or to loiter in the hallways or at his work, or to waste his time in any other manner will be regarded as disorderly. Schedules showing the arrangements of class and the hours to be given by the instructors to each are posted in conspicuous places. Students must observe these schedules and may not claim the teachers' attention at other hours. No book, chart or other educational appliance, which is the property of the School, will be allowed to leave the building under any circumstances.

EXAMINATIONS.

Mid-year Examinations are held at the end of January, and the Final Examinations at the close of the school year, in all branches.

CERTIFICATES AND DIPLOMAS.

Certificates setting forth the standing in each branch of study are awarded to students of the First and Second Year Regular Textile Day Course and to students of the Second Year Woolen Course and Second Year Cotton Course on the following conditions: A degree of "Excellent," "Good" or "Fair" must have been attained for the year's work in each branch taught in the respective classes, and the Final Examination must have been passed in a satisfactory manner. A student who is marked "Failed" in any branch of his year's study will not be awarded a certificate. The Diploma of the School is awarded to students of the Third Year Regular Textile Day Course, who have obtained the First and Second Year's Certificates and who have also completed their third year's work in accordance with the foregoing conditions. Certificates are also awarded on the completion of the Course in Carding and Spinning; on the completion of the Course in Chemistry and Dyeing, and to students who have completed in a satisfactory manner, including the Final Examinations, the Regular Three Year Evening Textile Course, the Regular Three Year Evening Chemistry Course or the Three Year Evening Dyeing Course.

NOTE—No student is promoted into an advanced class who has not completed the work of the preceding year, including the examinations, in a satisfactory manner.

HONOR MEDALS.

Medals are offered for competition to properly qualified students on the following terms:

To the Graduating Class:

THE THEODORE C. SEARCH GOLD MEDAL.

To earn this prize, the student must, in addition to having completed the three years' regular course, and passed his examinations in an eminently satisfactory manner, have undertaken some special research into a matter relating to the Textile Industry, on the results of which, as expressed by a thesis or some practical result accomplished, or both, the award will be made.

THE EXHIBITION HALL.

To students who have been in attendance at least two years:

THE TEXTILE WORLD GOLD MEDAL.

This medal is awarded to the student who submits the best thesis on a subject relating to the Application of Chemistry to the Textile Industry; conditions to be definitely announced on February 1st each year. To earn this prize the student must have satisfactorily completed some course embracing Chemistry and Dyeing, which would require an attendance of not less than two years.

WORK OF STUDENTS.

All fabrics woven in the School become the property of the School. The School also reserves the right to retain one specimen of each student's work in each branch studied.

TOOLS AND MATERIALS.

The tools required in the Regular Course, Woolen Course and Cotton Course are: A set of drawing instruments, a drawing board, a pair of plyers, a pair of scissors and a reed hook. All tools and also materials, such as designing paper, paints, brushes, drawing boards, drawing instruments, pencils, etc., are for sale in the School at less than retail prices. The expense of these is usually about $15.00 per year. All students of the School are expected to provide themselves with a full suit of overalls.

BOARD.

Good board may be obtained in the vicinity of the School for $4.50 a week and upward. A list of desirable boarding houses is kept at the School, and will be furnished on application.

EMPLOYMENT FOR GRADUATES.

The School does not undertake to find positions for graduates. From time to time, however, applications are received for persons qualified to fill positions in the Mill, Dyehouse, Laboratory, Commission House, etc., and where it can be conscientiously done, pleasure is taken in recommending those who have attended the School.

Subjects of Study—Day School

Regular Course—First Year

WEAVE FORMATION.

General principles of the structure of weaves—Explanation of "Warp" and "Filling."—Methods of representing weaves on squared paper.—Classification of weaves.—Foundation and derivative weaves.—Plain weave and the methods of ornamenting it. Methods for constructing the various twill and satin weaves.—Influence of the twist of yarn on the effect of the weave.—Explanation of drafting.—Rules for preparing drawing-in drafts and chain drafts from weaves.—Reducing weaves to their lowest number of harnesses.—Calculating the number of heddles required for plain and fancy drafts.—Various weaves derived from the "Foundation Weaves."—Methods for their construction.—The various fabrics to which they are adapted.—Circumstances which make it more advantageous to use one class of weaves than another.—Weaves which are suitable for particular classes of fabrics in contrast with weaves for other classes.—Weave combination.—Points to be considered in making a combination.—Consideration of "Texture" in placing weaves together.—Weaves which take various amounts of filling.—Weaves which take up the warp at different rates.—Combining Weaves to form stripes and checks.—Effect of color on the weave.—The appearance of the weave effected by the manner of dressing the warp and introducing the filling.—One-and-one and two-and-two systems.—Utility of the one-and-one system on common weaves.—Two-and-two and four-and-four applied to fancy weaves.—Irregular patterns from two shades.—An extra filling added to weaves.—Figured effects produced by floating the extra filling on the face.—Figures produced by so stitching the extra filling as to produce light and dim effects.—Single-faced and double-faced fabrics produced by using an extra filling.—Extra filling for adding weight to a fabric.—The addition of an extra warp.—Single and double-faced fabrics produced by using an extra warp.—The use of an extra warp for figuring on the

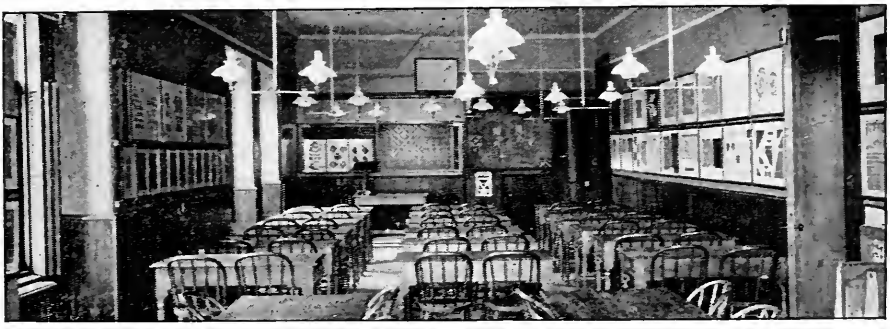
face.—Increasing the weight by the use of an extra warp.—Worsted and woolens.—Proper methods of stitching the back to the face.—Effect of improper stitching.—Imperfect cloth resulting from the same.

ANALYSIS AND STRUCTURE OF FABRICS.

Cotton, wool, worsted, silk and other varieties of yarns and fabrics are carefully investigated and discussed with a view to the formation of desired fabrics. A brief outline of the plan of work is here appended.

YARN CALCULATIONS.—Grading yarns with regard to size.—Consideration of the various systems in their relation to one another in one or more ply threads.—The relation of count, weight and length of different threads.

FABRIC ANALYSIS.—Ascertaining the weave, drawing-in draft, chain draft, ends and picks per inch, arrangement of warp and filling



ONE OF THE LECTURE ROOMS.

colors, counts of warp and filling, take-up in weaving.—Amount of each color and material required in a given length of goods.

FABRIC STRUCTURE.—Is studied in part by observation and deductions based on the results obtained in the thorough analysis of fabrics which may be remarkable for their good or bad qualities. This subject also includes the origination of specifications, designs and colorings for prescribed fabrics, the majority of which are executed by the student, thus enabling him to see the actual result of his thought.

COLOR HARMONY.

Theory of Color.—Drawing of diagrams showing primaries, secondaries, and tertiaries, and their relation to one another.—Mixing and grinding of pigments.—Color matching from yarns and printed fabrics.—Harmonies of analogy, self-color and

analogous color.—Harmonies of contrast.—Active colors, and active and passive colors.—Coloring patterns for stripes, plaids and figured effects.

FREE HAND DRAWING AND PRINCIPLES OF FIGURED DESIGN.

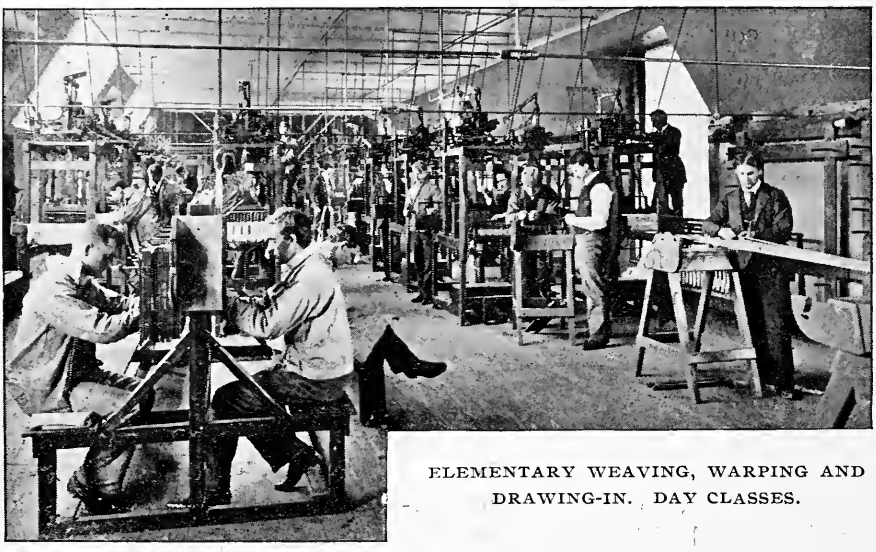
Preparatory free hand drawing bearing on Textiles.—Plant forms and their use in the decoration of fabrics.—Material limitations in the production of ornament.—Ornamentation limited by the uses for which the fabric is intended.—Construction of ornament on the various geometrical bases: square, triangle, hexagon, etc.—Diaper ornament.—Various methods of distributing forms.—Conventionalization of natural forms.—Sketching of designs suitable for woven stuff.—Fabric size.

NOTE.—In connection with this branch of study the Principal gives a course of illustrated lectures on the Derivation and History of Ornamental Forms; Principles of design; Conventionalization; and the Theory of Color.

MECHANICAL DRAWING.

Selection, preparation and use of instruments.—Elementary line drawing.—Elementary geometrical problems.—Orthographic projections.—Surface developments.—Various cycloidal and involute curves.—Their adaption to toothed gearing.—Construction of cams for producing weaves and for other motions used in textile machinery.

NOTE.—These lessons occupy a period of two hours per week for twelve weeks of the school year.



ELEMENTARY WEAVING, WARPING AND DRAWING-IN. DAY CLASSES.

JACQUARD DESIGN.

The history of the Jacquard machine.—General explanation of the machine.—Tracing the connection between the pattern card and the action of the warp thread.—The comparison of the harness machine and Jacquard machine.—The explanation and making of drawings of the internal mechanisms of the different forms of machines.—The single lift, single cylinder.—Single lift, double cylinder.—Double lift, single cylinder.—Double lift, double cylinder.—Raise and drop.—Various tie-ups and methods of laying them out and threading the comberboard.—The French and English systems of tying up.—The straight through.—The point or centre.—The combination of straight and point.—Straight through, for repeated effects in one repeat of the pattern.—Principle of card stamping.—Enlarging sketches to workable designs.—Card cutting and weaving.

WARP PREPARATION AND WEAVING.

Analysis and explanation of the hand loom.—Various methods of forming the "shed."—Lambs, treadles and countermarch.—Dobbies and witches.—Calculations as to texture and ends in warp, width in reed, etc.—Arranging the threads to form the warp.—Beaming.—Drawing-in, twisting-in and reeding.—Adjusting the warp in the loom.—Pattern chain building.—Weaving on the hand loom of a prescribed number of fabrics of cotton, wool and worsted. In addition to the above, all students in this class will be required to devote a certain amount of time to power loom practice. All those who have had such practice in the mill may, however, be excused.

NOTE.—The variety of fabrics produced is laid out so as to coincide with the instruction in Fabric Structure and Design given at the time. The student performs all the operations mentioned in the foregoing list.

CHEMISTRY.

GENERAL INORGANIC.—The general properties of matter.—Simple and compound bodies.—Laws of chemical combination.—Elements, atoms and molecules.—The atomic theory.—Chemical calculations.—Preparation, classification and chemical behavior of the chief elements and their compounds, comprising the non-metals and metals, with special reference to those of commercial importance.

NOTE.—In connection with the experimental work of the laboratory illustrated lectures on subjects treated are given at stated intervals.

COTTON CARDING AND SPINNING.

For the detail of subjects under this head see page 50.

Regular Course—Second Year

WEAVE FORMATION.

Value of a knowledge of double cloth weaves.—Methods of constructing double cloth weaves, and of indicating them on designing paper.—Consideration of the various proportions of face and back, such as, one face and one back ; two face and one back ; three face and one back.—Also those on which the warp and filling have not the same arrangement, such as, one face and one back in warp, and two face one back in filling ; two face one back in warp, and one face one back in filling and other irregular arrangements.—Rules for stitching double cloth weaves—Invisible stitching.—The production of figures by means of the stitching.—The "double plain weave" in its many forms of utility.—Two color and three color striped weaves.—Double plain weaves for reversible figured effects.—Weaves for such special fabrics as Bedford cords, pique, figured pique, Marseilles, coatings, matellasses, face finished fabrics, beavers, kerseys, meltons, tricots, chinchilla, etc., weaves.—Longitudinal and diagonal rib weaves.

ANALYSIS AND STRUCTURE OF FABRICS.

Cotton, wool, worsted, silk and other varieties of yarns and fabrics are considered on somewhat the same plan as in the first year, but by means of more difficult problems.

YARN CALCULATIONS embrace a study of the shrinkages which are encountered in the various operations of weaving and finishing, in their effect on the resulting fabrics.—The selection of proper yarns for required weights of goods and for given textures.

FABRIC ANALYSIS is followed largely in double cloths, and in addition to the points looked for in the first year analysis, the student is brought in contact with the question of two or more warps and fillings in the one piece. He thus includes in his research the question of different shrinkages and losses in his estimate of the quantity of materials necessary for a given finished piece of goods.

FABRIC STRUCTURE—In planning and calculating on the necessary specifications for the correct structure of fabrics, in this, the second year of the course, the student not only steps from single to double cloths, with the consequent augmentation of details, but he is also brought to a consideration of the subject of texture.

He is required to decide upon the proper number of warp and filling threads for the weave to be used, and to make all necessary allowances for ease in weaving and for shrinkages after being woven. Hence, a careful study of the question of volume or size of threads is essential, particularly in relation to the interlacings of the different weaves. The actual production of the fabric in all its details by the effort of the student lends much to the value of the knowledge gained.

COLOR HARMONY.

The principles of color combination imparted in the first year are put into effect in more practical ways. The student may not only color his design on paper, but produce the similar effect in the fabric by means of the dye house. Various color schemes are produced for suitings, plaids, dress goods, introducing novelty yarn effects. Plaids, stripes and figures are colored for ribbons, tapestries, carpets, etc.

JACQUARD SKETCHING AND DESIGN.

Sketching for Jacquard designs in fabric size.—Selection of the proper papers for the various textures and folds of cloth.—Enlarging and reducing sketches to suit the texture and capacity of machines.—Arrangement of designs for economical production.—Transferring the sketch from plain to squared paper.—Combinations of Jacquard and harness work.—Designs for special purposes, such as dress goods, quilts, draperies, table covers, cloakings, etc.—Drawings of various tie-ups, such as two sections, three sections, four sections.—Tie-ups with shaft lashing and tie-ups for special purposes.—Explanation of card stamping and card lacing.—Stamping cards for common damasks, reversible draperies, blankets, beaver shawls, double cloth, cloakings, etc.—Explanation of the structure of ingrain carpet.—Selection of designing paper for the different grades, such as fine, superfine, extra super, etc.—The weaves in common use and the effects produced by them in color as used in warp and filling.—The modification of the Jacquard machine to produce ingrain carpet.—Substitution of trap-boards and tail cords for hooks and griffe bars.—Working of the journals.—Tying up for cross point and center.—Arrangements of leashes in the journals.

WOOL AND WORSTED SPINNING.

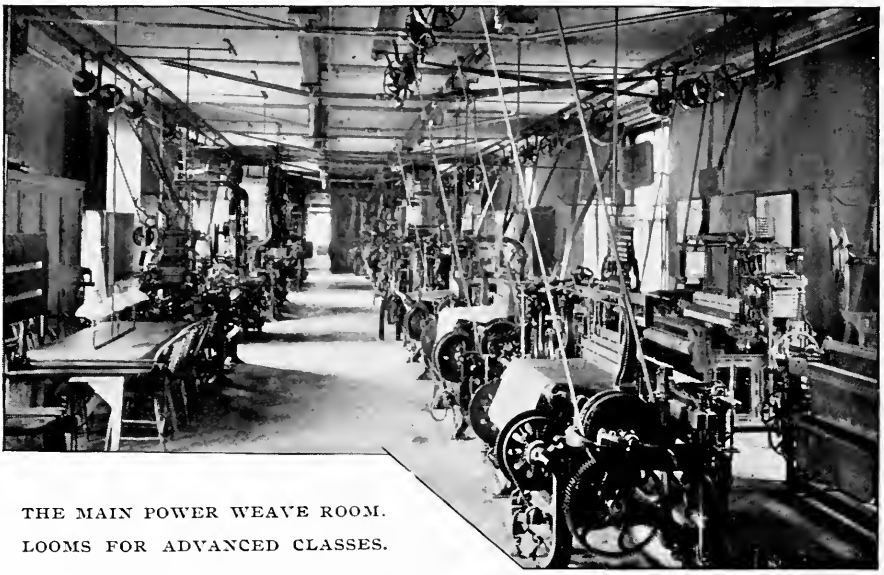
For detail of subjects under this head see page 54.

MACHINE DRAWING.

For detail of subjects under this head see page 51.

WARP PREPARATION AND WEAVING.

The study of the power loom.—The principles governing its parts.—Relation and timing of the parts.—The various shedding mechanism, cam motion, cam and scroll motion, dobby motion.—Open and closed shed looms, and the advantages of each.—The various picking motions, the alternating pick, the pick and pick, cam and cone, sliding pick motion.—Shuttle box motions, raise and drop box, skip box, circular box, boxes controlled by cams, by a chain and by the Jacquard.—Rules and calculations for change gears for the various take-up motions.—Ascertaining desired speed of shafting and size of pulley for given speed of loom.—Timing and setting of the box motions of the Knowles, Crompton, Wood, Furbush, Schaum & Uhlinger, Stafford and Whitin looms.—Knock-off motions.—Fast and loose reeds.—Harness and box chain building and care of stock.—Multiplier box chain building.—Production of fabrics for men's and women's wear, draperies, carpets, etc., from cotton, wool, worsted, silk and linen, on the latest and best looms made.



THE MAIN POWER WEAVE ROOM.
LOOMS FOR ADVANCED CLASSES.

NOTE.—The fabrics produced by each student are from his own designs and from yarns dyed by the students. He performs all the operations of Warping, Beaming, Drawing-in, Reeding, Placing in the loom, Chain Building and Weaving, and assists in the finishing of the fabrics.

CHEMISTRY.

QUALITATIVE ANALYSIS.—The analytical classification of the metals.—Characteristic tests for the different elements.—Detection of bases and acids in their compounds.—Solving of analytical problems.—Writing of reactions and calculation of results.—Laboratory practice in the manipulation of experiments and the handling of analytical apparatus.

DYEING.

WOOL DYEING.—Chemical and physical properties of the wool fibre.—Action of chemical agents.—Composition of yolk and suint.—Affinity of fibre for colors.—Detection of wool in mixed fabrics.—Bleaching and scouring of loose wool, yarn and cloth.—Water, with special reference to bleaching, scouring and dyeing.—Influence of impurities.—Correction and purification of water.—Mordants and methods of mordanting.—Theories of dyeing.—The natural coloring matters and their application to the fibre.—The artificial dyestuffs ; the basic, acid and neutral dyes.—

A VIEW IN THE CHEMICAL LABORATORY.

Different methods in their application to the fibre.—The mordant colors.—Assistants and levelling agents.—Practical work in the dyeing of loose wool, yarn and cloth with the various colors and classes of dyestuffs and the compounding of colors.

COTTON DYEING.—Chemical and physical nature of the fibre.—Natural impurities.—Behavior of the fibre with chemical agents. Mercerized cotton.—Oxycellulose and artificial silk.—Mordants ; the preparation, properties and application of the various chemicals used in mordanting cottons.—Tannin and oil mordants.—The natural and artificial coloring matters and their application to cotton.—The direct cotton colors.—Scouring and bleaching of cotton.—Practical work in the dyeing of loose cotton, yarn and cloth with the various dyestuffs.

FINISHING.

WORSTED AND WOOLENS.—Process of finishing defined.—The preparatory processes of finishing, such as burling, mending, inspecting and numbering.

Scouring and the various soaps and alkalies generally used.—Action and strength of soaps for the different kinds of cloth.—How the soap and alkalies should be applied.

The fulling process.—Why fulling is resorted to.—The properties of a good fulling soap.—The various influences which most affect the fulling of fabrics, such as the "character" of the "fibre," the "twist" of the "yarns."—The "nature" of the "weave."—The "weight" of the "goods," light or heavy.

Explanation of the term gigging.—The various machines and methods considered.—Dry and wet gigging defined.

Steaming and crabbing and necessity for such treatment.—Lustre cloths.

Shearing; its purpose.—The effects of previous treatment as to good shearing.—The proper adjustment of machine to shear the various kinds of cloths.—Grinding.

Pressing; rotary and plate pressers considered.—Proper heat and pressure.—Style of finish considered.

Regular Course—Third Year

WEAVE FORMATION.

The weaves studied in the third year of the course are necessarily those of a higher order. Three and more ply weaves are planned upon paper, both for plain and for figured effects, in such fabrics as overcoatings, cloaking, heavy draperies, etc. The study of doupe or leno weaves is gone into extensively, embracing single and double doupe, the combination of doupe and other orders of weaves, and the production of figured effects by means of single doupe. Weaves for such narrow fabrics as suspender and garter webs, goring, name webs, shoe pulls, etc. Various weaves for filling pile, and single and double warp pile goods. Methods of forming useful ground weaves for many purposes.

ANALYSIS AND STRUCTURE OF FABRICS.

The fabrics considered are in keeping with the instruction in Weave Formation, and are not only looked at from the standpoint of their intricacy, but they, as well as the simple fabrics

are studied with more of a view to the commercial end than in either of the preceding years. Various systems of mill book-keeping are explained, as well as the questions of commissions, datings, discounts, etc. In planning fabrics the student is thus led to keep the thought of relative cost well in mind.

COLOR HARMONY.

Advanced instruction in this subject is given, tending to unite the class work in designing, dyeing and weaving. The tendency is more towards originality. Experiment and research are encouraged in addition to certain fixed exercises.

JACQUARD SKETCHING AND DESIGN.

Sketching in fabric size. Methods of indicating the various warps on the squared paper in cases of two and three ply fabrics. Two or more filling effects to be shown on the squared paper. Methods of laying out designs for double scale and compound harness with reference to the working of the shafts. Designs for Jacquard gauze effects and the lay-out of the machine for carrying the doupes and slackeners. Completion of designs on squared paper for upholstery, quilts, cloakings, shoe pulls, suspenders, woven labels, brocades, neckties and special fabrics, etc.

CARDING AND SPINNING.

The subjects to be taken up under this head embrace advanced work in either cotton, wool, worsted, as may be elected. See pages 50 and 54.

WARP PREPARATION AND WEAVING.

This branch of instruction is confined to the higher classes of fabrics, such as are taken up in the work of structure of fabrics and Jacquard design. In addition to producing certain prescribed fabrics, the student is expected to execute fabrics from his own ideas, depending largely on his own resources, subject to the approval of the instructor, and thus cultivate the habit of self-reliance. All the necessary operations incidental to the production of the goods from the stock to the finished state are performed by the students.

CHEMISTRY.

QUANTITATIVE ANALYSIS.—Use of the balance and other apparatus.—Precipitation, filtration and weighing.—Gravimetric analysis of simple salts and materials used in the manufacture of textiles.—

Quantitative separations and determination of the metals.—Volumetric analysis.—Preparation and standardization of solutions.—Use of indicators.—Use and calibration of graduated apparatus.—Acidimetry and alkalimetry.—Calculation of results.

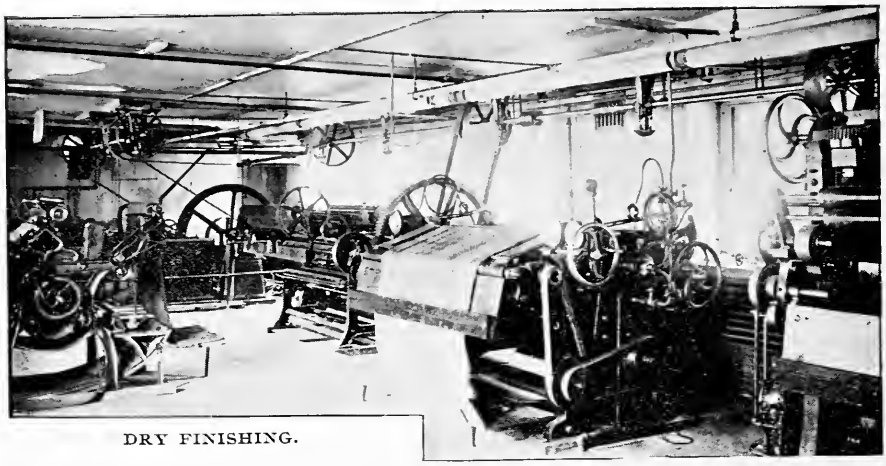
TECHNICAL ANALYSIS.—The preparation, properties and analysis of acids and alkalies, bleaching agents, soaps, oils, tannins, mordants and dyestuffs.—Commercial valuation.—Analysis of water and the more important substances used in the technical arts.

DYEING.

ADVANCED COURSE.—Advanced methods of scouring, carbonizing and dyeing.—Matching shades on yarns and fabrics.—Indigo vat dyeing.—Turkey red.—Alizarine shade matching.—Aniline black.—Silk dyeing ; study of the fibre and the action of chemicals and dyestuffs.—Machinery used in the various processes of dyeing, scouring and bleaching.

TESTING AND VALUATION OF DYESTUFFS.—Testing colors as to permanence against the action of light, scouring and fulling ; determination of commercial values of dyewares, mordants, bleaching agents, scouring agents, etc.—Purification of spent liquors and recovery of waste products.—Detection of dyestuffs on fibres and otherwise.—Detection of the different fibres in mixed goods.

NOTE.—Students will be furnished with Nitrate of Silver, Chloride of Platinum, Platinum Wire and Platinum vessels at cost.



DRY FINISHING.

FINISHING.

WORSTEDS AND WOOLENS.—Fulling.—Ancient and modern methods compared.—General time of fulling on various classes of goods.—

How to calculate the shrinkage in length and width to give desired weight.—How and when to flock.—What percentage of flocks it is desirable to use, conditions considered.

Heat and pressure, and other conditions in fulling considered.

The moisture of goods in wet gigging.—Raising for various kinds of finish, "doeskin finish, "velvet finish," "dry finish," "scotch or melton finish," "worsted finish" napping.

Tub steaming or boiling compared with upright steamer or gig.

Drying.—Comparison of the various drying machines in general use.—Effects of tentering in open air compared with machine drying.

Shearing and pressing further considered.—Final inspection, Measuring, rolling, shading.—Causes of imperfections, their prevention and remedy.—Allowances.

Cotton Course—First Year

WEAVE FORMATION.

For a description of this subject see page 38.

ANALYSIS AND STRUCTURE OF FABRICS.

The work to be taken up in this subject includes yarns and fabrics of cotton, and follows the general outline given on page 39.

COLOR HARMONY.

For detail of this subject see page 39.

FREE HAND DRAWING AND PRINCIPLES OF FIGURED DESIGN.

Preparatory Free Hand Drawing bearing on textiles.—Plant forms and their use in the decoration of fabrics.—Mechanical methods of producing ornament.—Material limitations in the production of ornament.—Ornamentation limited by the uses for which the fabric is intended.—Construction of ornament on the various geometrical bases: square, triangle, hexagon, etc.—Diaper ornament.—Various methods of distributing forms.—Conventionalization of natural forms.—Sketching of design suitable for woven stuffs. Finished cloth size.

NOTE.—In connection with this branch of study the Principal gives a course of illustrated lectures on the Derivation and History of Ornamental Forms; Principles of Design; Conventionalization; and the Theory of Color.

MECHANICAL DRAWING.

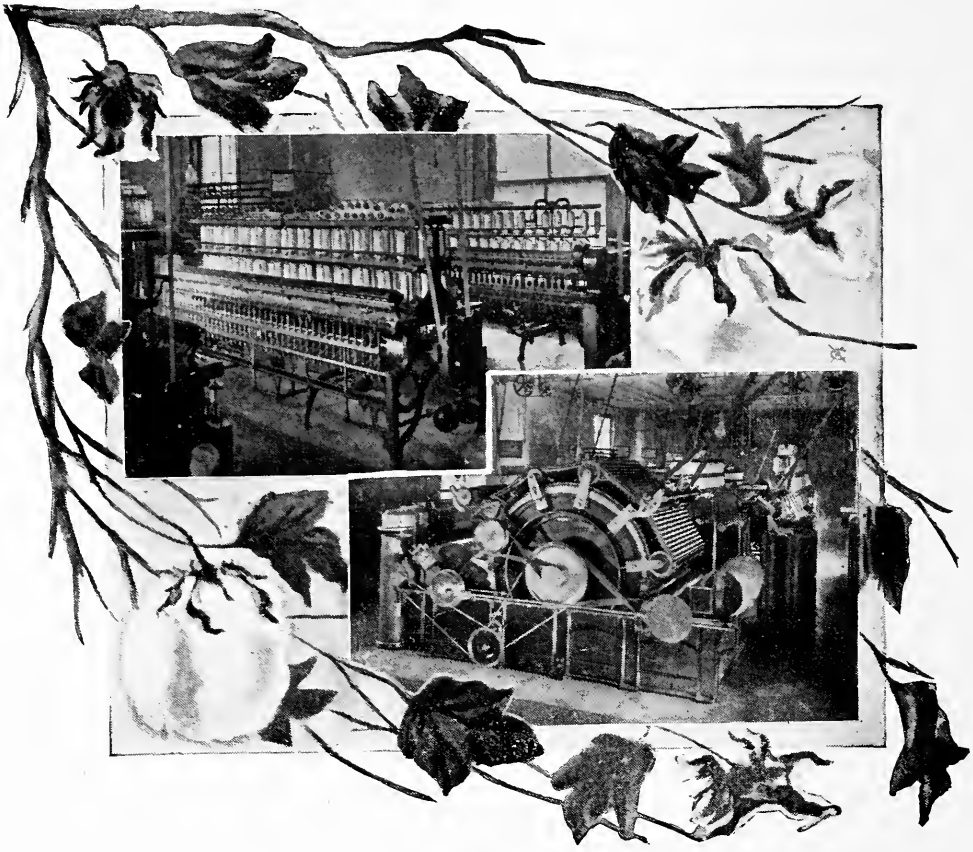
For details of the subject see page 40.

JACQUARD DESIGN.

For details of this subject see page 41.

CARDING AND SPINNING.

The classification of the cotton plant.—The position of the cotton-growing districts geographically considered.—The nature of the soils suitable for its growth.—Causes of injury to the fibre prior to harvesting.—Chemical and physical structure of the fibre and comparison with other fibres.—Explanation of the processes



COTTON CARDING AND SPINNING.

of picking, ginning, packing, mixing, willowing, opening, pickering, carding, combing, drawing, slubbing, intermediate and roving frames, spinning.

Carding.—Development of the modern card from Hargraves' and Arkwright's ideas.—Roller, flat and revolving flat cards.—Breaker and finisher cards.—Card clothing for the

different cylinders.—Card grinding by hand and machine.—Needle, diamond, chisel and hooked points on card wire.

The process of combing.—Its necessity in fine counts.—The consideration of various cotton combs.

The object of drawing.—The drawing frame.—Speed of the rollers and their action.—Requirements in drawing for the various cottons.

Construction and use of the slubbing frame.—Intermediate or second slubbing.

The roving frame.—The differential motion of the spindles and bobbin in the roving and fly frames ; also in the intermediate slubbing frames.

The commencement of the modern system of spinning.—The principle of the water frame applied to roving, slubbing and drawing.—The squaring band.—The self-acting mule.—Analysis of the mule head.

NOTE.—The preceding outline of subjects is followed both in Theory and Practice.

MACHINE DRAWING.

This study is taken up as an adjunct to the work in carding and spinning, the purpose being to impress upon the mind the form and relative position of one part to another. The portions of the machine drawn are necessarily only the more essential ones, such as sectional diagram of the revolving flat card, with banding for burnishing and stripping ; draft gearing, for railway heads ; details of drawing frames, roving and spinning frames. The reasons for their peculiarities of structure and position are explained and discussed, so that by thus supplementing the lectures, and practical work in carding and spinning, the student is enabled to obtain an acquaintanceship with the various machines, which should be most thorough.

WARP PREPARATION AND WEAVING.

The details of subjects under this heading will be found on page 41. The fabrics produced will be those into which cotton enters.

CHEMISTRY.

The work in this subject is Elementary in character, and is carried on by means of lectures and recitations, coupled with considerable laboratory work in experimentation on the properties and preparation of the chemical elements and their compounds.

For detail of subjects see Chemistry, page 41.

Cotton Course—Second Year

WEAVE FORMATION.

The methods of planning weaves into which an extra filling is to be introduced for the purpose of producing some figured effect, as exemplified in such fabrics as "coin spots" dotted Swisses, etc. The principles of planning double cloth weaves, embodying the use of two or more warps and fillings.—Weaves for such special double cloths, as pique or welts, Bedford cords, Marseilles, lace effects, etc.—Various methods of planning weaves, which will produce ornament on the foregoing fabrics.—Weaves for different styles of imitation gauze.—Gauze weaving in one or more doupes.—The combination of doupe with other classes of weaves.—Weaves for producing fancy effects by means of one doupe.—The Lappet form of weaves.—Weaves for honeycombs and similar fabrics.—Weaves for fancy Madras and cheviots.

ANALYSIS AND STRUCTURE OF FABRICS.

For an outline of this subject see page 42, which is followed in so far as it applies to cotton fabrics.

COLOR HARMONY.

For detail of subjects see page 43.

JACQUARD SKETCHING AND DESIGN.

Sketching for Jacquard designs in fabric size.—Selection of the proper papers for the various textures and folds of cloth.—Enlarging and reducing sketches to suit the texture and capacity of machines.—Arrangement of designs for economical production.—Transferring the sketch from plain to squared paper.—Combinations of Jacquard and harness work.—Designs for special purposes, such as dress goods, quilts, draperies, table covers, etc.—Drawings of various tie-ups, such as two sections, three sections, four sections—Tie-up with shaft lashing, and tie-ups for special purposes.—Explanation of card stamping and card lacing.—Stamping cards for common damasks, reversible draperies, fancy figured cotton stuffs, etc.

CARDING AND SPINNING.

For detail of subjects see page 50.

WARP PREPARATION AND WEAVING.

The study of the power loom and weaving calculations will follow the outline found on page 44. The fabrics produced will be from the student's design, and will include a line of goods of a varied and instructive nature. Doupe weaving will be performed on different styles of heddles. The student will perform all the necessary operations of dressing, beaming, twisting or drawing-in, reeding, chain building, etc.

DYEING.

COTTON DYEING.—Chemical and physical nature of the fibre.—Natural impurities.—Behavior of the fibre with chemical agents.—Mercerized cotton.—Oxycellulose and artificial silk.—Mordants; the preparation, properties and application of the various chemicals used in mordanting cottons.—Tannin and oil mordants.—The natural and artificial coloring matters and their application to cotton.—The direct cotton colors.—Scouring and bleaching of cotton.—Practical work in the dyeing of loose cotton, yarn and cloth with the various dyestuffs.

Woolen and Worsted Course—First Year

WEAVE FORMATION.

For a description of this subject see page 38.

ANALYSIS AND STRUCTURE OF FABRICS.

The work to be taken up in this subject includes woolen and worsted yarns and fabrics, and follows the general outline given on page 39.

CHEMISTRY.

GENERAL INORGANIC.—The general properties of matter.—Simple and compound bodies.—Laws of chemical combination.—Elements, atoms and molecules.—The atomic theory.—Chemical calculations.—Preparation, classification and chemical behavior of the chief elements and their compounds, comprising the non-metals and metals, with special reference to those of commercial importance.

COLOR HARMONY.

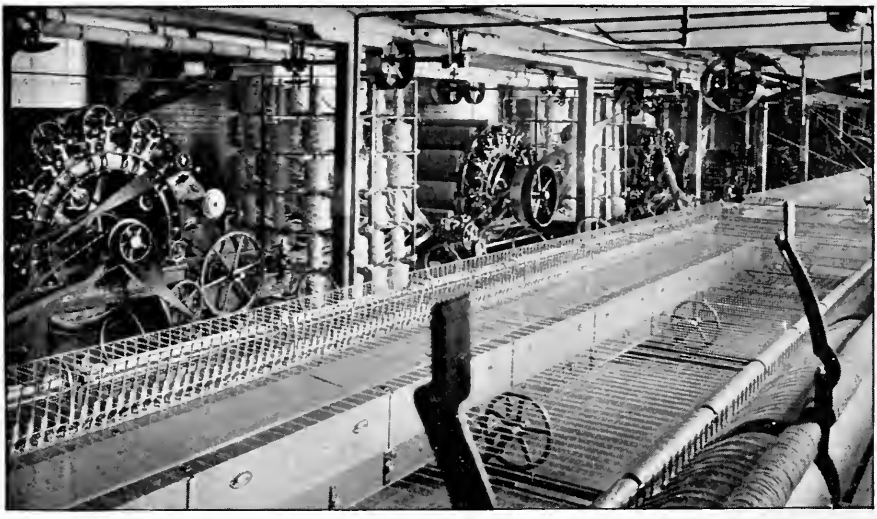
For the detail of these subjects see page 39.

MECHANICAL DRAWING.

For detail of subjects see page 40.

PRINCIPLES OF THE JACQUARD MACHINE.

General explanation of the Jacquard machine.—Tracing the connection between the pattern card and the action of the warp thread.—The comparison of the harness machine and Jacquard machine.—The explanation and making of drawings of the internal mechanisms of the different forms of machines.—The single lift, single cylinder.—Single lift, double cylinder.—Double lift, single cylinder.—Double lift, double cylinder.—Raise and drop.—Various tie-ups and methods of laying them out and threading the comberboard.—Principles of card cutting.

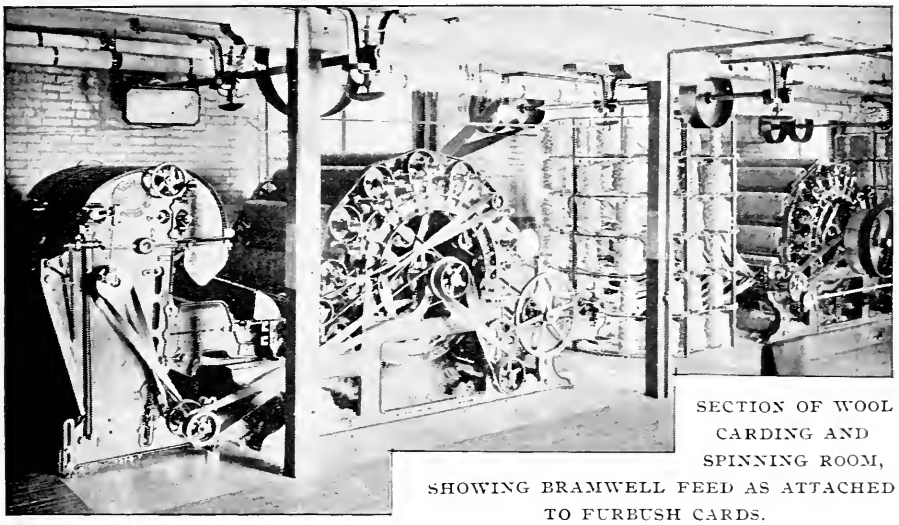


WOOL CARDING AND SPINNING.

WOOL AND WORSTED SPINNING.

RAW MATERIAL.—The wool fibre.—Distinction between wool and hair. Growth.—Nature.—Elasticity.—Trueness of breeding.—Strength.—Softness.—Fineness and length.—Color.—Felting properties.—Wools of different countries.—Comparison of various American wools.—Cashmere.—Alpaca.—Mohair.—Points to be looked for when purchasing wool.—Explanation of the term "Fleece of Wool"—Grading of the fleece.—Sorting.—Uses of the sorts.—Different qualities of wool.—Range and names of qualities.—Skin or pulled wool.—Calculations on shrinkages and yields in different grades of stock.—Different methods of scouring and

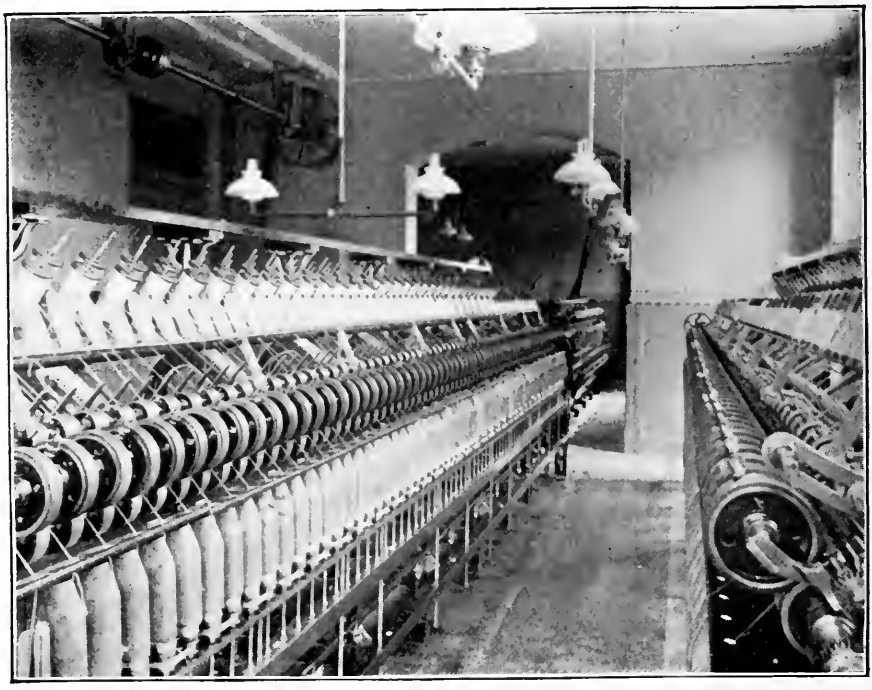
agents which may be employed.—Handling the stock while scouring.—The preparation, heat and strength of scouring liquids.—The principles involved and methods pursued in carbonizing.—Natural and artificial drying.—Heating and ventilating dryers.—Extractors.—The term "Noil."—Various kinds of noils.—Mungo and shoddy.—Kinds and qualities of shoddies.—Extracts.—Wastes.—Garnetted and other forms.—Flocks.—The methods or processes by which they are produced.—Uses and clothing properties of wool substitutes.—Consideration of the size and nature of fibres which may be blended in order to produce required results in the yarn and in the finished fabric.



SECTION OF WOOL CARDING AND SPINNING ROOM, SHOWING BRAMWELL FEED AS ATTACHED TO FURBUSH CARDS.

WOOLEN YARNS.—Burring and pickering.—Consideration of the various burring and pickering machines in use.—Preparation of and methods adopted in laying down a mixing according to percentages obtained.—Oiling the mix.—Testing and selection of oils.—Explanation of the term, "Set of Cards."—First breaker, second breaker and finisher.—Names and uses of the various rolls and cylinders.—Truing-up of cylinders.—Card clothing.—Construction, classification and uses.—Methods of clothing.—The various rolls and cylinders.—Grinding card wire.—Frame, traverse and roll grinders.—Setting the various cylinders in their proper relation to one another.—Methods and appliances used in making the various woolen novelty yarns.—Dissecting yarns to find the

percentages of different colors.—Hand, ball, creel and automatic feeding, including Bramwell, Apperly, Scotch Tindel, Fisher, etc. —Their construction.—Condensers.—Ring system.—Single and double doffers.—Bolette single doffer, steel blade dividers.—German single doffer, strap dividers.—Comparison and value of each.—Rubbing motions.—Rolls.—Aprons, and aprons and rolls combined.—Single, double and quadruple bank apron rubbers.—Spinning.—The history and development of spinning.—Hand jack.—Self operator and self-acting mule.—Present perfection of the mule.—The mule-head.—Means of actuating the rolls, spindles and carriage.—Backing off.—Winding mechanism.—The



VIEW IN WORSTED SPINNING ROOM.

quadrant and its functions.—The builder rail and method of regulating it.—Automatic regulation of the fallers.—Changing the speed of the various parts.—Calculations for twists, drafts and speed for different grades of yarn.—Drawings of the principal parts of the various machines used.

WORSTED YARNS.—Difference between worsted and woolen.—History and development of worsted spinning.—Development of the in-

dustry in the United States.—Characteristics of each yarn duly considered.—Process of worsted yarn manufacture defined.—Preparing by gill boxes.—What wools are prepared, and why they are not carded.—Carding.—Construction and arrangement of a worsted card.—Difference between preparing and carding.—Back washing and gilling.—Combing by hand.—The principles and development of machine combing.—The Noble, Lister and Holden comb considered.—Balling or top making explained.—Principles of drawing.—Construction of drawing and roving frames.—The different systems of open-cone and French drawing considered.—Varying speed and drag of the bobbin in the open system of drawing.—Stop motions.—Gauge points and their uses.—The ratch.—Worsted spinning.—Cap, flyer and ring spinning frames.—The mule, its adaptation for the spinning of worsted yarns.—Comparison of methods in spinning of cotton, wool or worsted on the mule.—Doubling and twisting.—The comparisons, principles and construction of various well-known machines.—Hanking.—Balling or bundling for the market.—Also a prescribed amount of practical work is required on these machines in the production of the various yarns desired by the school.

NOTE.—The practical work in this part of the subject is confined to the drawing and spinning.

WARP PREPARATION AND WEAVING.

The consideration of the motions of weaving.—Laying of the pattern and warp dressing.—Setting the warp and beaming.—The preparation of the harness and calculating for the number of heddles for plain and fancy drafts.—Drawing-in and reeding. Placing the warp in the loom.—Tying-in and leveling the harness.—Determination of the proper warp line.—Pattern chain building. In this year, for the sake of the better opportunity of studying the effect of the different weaves, and also on account of the additional number of patterns which may be produced, the weaving will be executed largely on the hand loom. Toward the latter end of the year, however, the opportunity will be given for practice on the power loom. A reasonable amount of power loom weaving will be required of each student, provided he has not already had it in the mill. The fabrics produced will be only such as contain wool.

Woolen and Worsted Course—Second Year

WEAVE FORMATION.

The manner of forming what is termed a double cloth weave and the principles involved. Methods of stitching the two fabrics together either invisibly or for the purpose of utilizing the stitching in the production of figured effects. Weaves for fabrics having invisible stitching, such as certain forms of trouserings and suitings, beavers, kerseys, meltons. Weaves for fabrics in which stripes are formed by means of the stitching, such as hairlines, matellasses, cords, etc. Figured effects produced by means of the stitching. Weaves in which the face and back fabrics interchange, producing figures. Weaves for crepon and other special forms of dress goods. Weaves for chinchilla and similar styles of overcoatings. The method of placing weaves for three-ply fabrics.

ANALYSIS AND STRUCTURE OF FABRICS.

For an outline of this subject see page 42, which is followed in all that relates to woolen and worsted yarns and fabrics.

COLOR HARMONY.

The student is expected by this time to have mastered the elements of color in its relations of contrast and analogy. Advance work is taken up in coloring designs, which may, in conjunction with the dye house, be produced in the weave room and thus preserve the natural continuity of the subject.

WOOL AND WORSTED SPINNING.

The work on this subject will consist of advanced study of the subjects outlined for the previous year. The intelligent handling of the machines in the practice of carding and spinning of wool and the drawing and spinning of worsted makes it necessary that all of these subjects should be touched on to a more or less extent in the first year, and the second year is required in order that they may be taken up in detail, together with higher calculations.

MACHINE DRAWING.

This study is taken up as an adjunct to the work in carding and spinning, the purpose being to impress upon the mind the

form and relative position of the parts. The portions of the machines drawn are necessarily only the more important ones, such as the weighing motion of the Bramwell feed ; the direction of wire and belting of the card ; the rub motion ; the builder, backing off and quadrant motions of the mule head ; the faller motion of the gill box ; the drawing frame, showing front and back rolls, with mechanism for ratch adjustment ; builder and knock-off motions for spinning frame.

The reasons for their peculiarities of structure and position are explained and discussed, so that by thus supplementing the lectures and practical work in carding and spinning of wool, and the drawing and spinning of worsted, the student is enabled to obtain an acquaintanceship with the various machines, which should be most thorough.

WARP PREPARATION AND WEAVING.

The study of the power loom is similar to the line of subjects shown on page 44. The fabrics produced embrace a great variety of worsted and woolens from the student's own designs and calculations. All of the necessary operations of preparing the yarn for the loom, such as dressing, beaming, drawing-in, reeding, chain building, etc., are performed by the student.

DYEING.

Elementary Wool Dyeing.—Chemical and physical properties of the wool fibre.—Action of chemical agents.—Composition of yolk and suint.—Affinity of fibre for colors.—Detection of wool in mixed fabrics.—Bleaching and scouring of loose wool, yarn and cloth.—Water, with special reference to bleaching, scouring and dyeing.—Influence of impurities.—Correction and purification of water.—Mordants and methods of mordanting.—Theories of dyeing.—The natural coloring matters and their application to the fibre.—The artificial dyestuffs ; the basic, acid and neutral dyes. —Different methods in their application to the fibre.—The mordant colors.—Assistants and levelling agents.—Practical work in the dyeing of loose wool, yarn and cloth with the various colors and classes of dyestuffs and the compounding of colors.

FINISHING.

Worsted and Woolens.—(Same as Second Year Regular Class.)—For outline of subjects see page 46.

Silk Course—First Year

WEAVE FORMATION.

For a description of this subject see page 38.

ANALYSIS AND STRUCTURE OF FABRICS.

This subject is considered largely on the general lines laid down on page 39, application being made to such fabrics as taffetas, gros grains, faille francaise, satins, peau de soie, rhadines, etc., both narrow and broad, in their plain and also elementary figured forms.—Methods of determining the size and quantity of silk in given samples.—Determination of weighting, estimation of size of silk before boiling off and of amount of weighting.

COLOR HARMONY.

Theory of color.—Drawing of diagrams showing primaries, secondaries, and tertiaries, and their relation to one another.—Mixing and grinding of pigments.—Color matching from yarns and printed fabrics.—Harmonies of analogy, self-color and analogous color.—Harmonies of contrast.—Active colors, and active and passive colors.—Coloring patterns for stripes, plaids and figured effects.

FREE HAND DRAWING AND PRINCIPLES OF FIGURED DESIGN.

Preparatory freehand drawing bearing on Textiles.—Plant forms and their use in the decoration of fabrics.—Mechanical methods of producing ornament.—Material limitations in the production of ornament.—Ornamentation limited by the uses for which the fabric is intended.—Construction of ornament on the various geometrical bases: square, triangle, hexagon, etc.—Diaper ornament.—Various methods of distributing forms.—Conventionalization of natural forms.—Sketching of designs suitable for woven stuffs.—Fabric size.

NOTE.—In connection with this branch of study, the principal gives a course of illustrated lectures on the Derivation and History of Ornamental Forms, Principles of Designs, Conventionalization and Theory of Color.

MECHANICAL DRAWING.

For details of this subject see page 40.

JACQUARD DESIGN.

The history of the Jacquard machine up to its present state of perfection.—General explanation of the machine.—Tracing the connection between the pattern card and the action of the warp thread.—The comparison of the harness machine and Jacquard machine.—The explanation and making of drawings of the internal mechanisms of the different forms of machines.—The single lift, single cylinder.—Single lift, double, cylinder.—Double lift, single cylinder.—Double lift, double cylinder.—Raise and drop.—Various tie-ups and methods of laying them out and threading the comberboard. The French and English systems of tying-up. The straight through.—The point or center.—The combination of straight and point.—Straight through for repeated effects in one repeat of the pattern.—Principles of card stamping.—Enlarging sketches to workable designs.—Card cutting and weaving.

WARP PREPARATION AND WEAVING.

Analysis and explanation of the hand loom. Various methods of forming the "shed."—Lambs, treadles and countermarch.—Dobbies and witches.—Calculations as to texture and ends in warp, width in reed, etc.—Arranging the threads to form the warp.—Beaming.—Drawing-in, twisting-in and reeding.—Adjusting the warp in the loom.—Pattern chain building.—Weaving on the hand loom of a prescribed number of fabrics.—In addition to the above, all students in this class will be required to devote a certain amount of time to power loom practice.—All those who have had such practice in the mill may, however, be excused.

NOTE.—The variety of fabrics produced is laid out so as to coincide with the instruction in analysis and fabric structure given at the time. The student performs all the operations mentioned in the foregoing list.

CHEMISTRY.

GENERAL INORGANIC.—The general properties of matter.—Simple and compound bodies.—Laws of chemical combinations.—Elements, atoms and molecules.—The atomic theory.—Chemical calculations.—Preparation, classification and chemical behavior of the chief elements and their compounds, comprising the non-metals and metals, with special reference to those of commercial importance.

Silk Course—Second Year

WEAVE FORMATION.

The work of the second year of this course being confined largely to figured effects, all the higher forms of weaves are studied in their application to the Jacquard machine. Weaves for two or more ply fabrics are studied and planned upon the squared paper, each of the two or more systems of warp and of filling being considered in its proper place. Methods of producing figured effects by the use of the multiple fabric principle of weaves. Figured weaves having warp and filling flushes. Weaves for Cannele effects. Repp and Bayadere weaves.

ANALYSIS AND STRUCTURE OF FABRICS.

A general outline of the work as followed is given on page 42. The yarns and fabrics covered include those of silk of a higher and more intricate nature. Fancy armures are studied, together with such fabrics as satin damasse, brocaded taffetas and gros grains. Ombre effects. Various styles of ribbons. Double faced satins, etc.

COLOR HARMONY.

The principles of color combination imparted in the first year are put into effect in more practical ways. The student may not only color his design on paper, but produce the similar effect in the fabric by means of the dye house. Various color schemes are produced for suitings, plaids, dress goods, introducing novelty yarn effects. Plaids, stripes and figures are colored for ribbons, tapestries, etc.

JACQUARD SKETCHING AND DESIGN.

Sketching for Jacquard designs in fabric size.—Selection of the proper papers for the various textures and folds of cloth.—Enlarging and reducing sketches to suit the texture and capacity of machines.—Arrangement of designs for economical production.—Transferring the sketch from plain to squared paper.—Combinations of Jacquard and harness work. Designs for special purposes, such as dress goods, draperies, vestings, and upholstering stuffs, etc.—Drawings of various tie-ups, such as two sections, three sections, four sections, tie-up with shaft lashing, and tie-ups

for special purposes.—Explanation of card stamping and card lacing.—Stamping cards for damasks, reversible draperies, brocades, etc.

WARP PREPARATION AND WEAVING.

The study of the power loom.—The principles governing its parts.—Relation and timing of the parts.—The various shedding mechanism, cam motion, cam and scroll motion, dobby motion.—Open and closed shed looms and the advantages of each.—The various picking motions, the alternating pick, the pick and pick, cam and cone, sliding pick motion.—Shuttle box motions, raise and drop box, skip box, circular box, boxes controlled by cams, by a chain and by the Jacquard.—Rules and calculations for change gears for the various take-up motions.—Ascertaining desired speed of shafting and size of pulley for given speed of loom.—Timing and setting of the box motions of the Knowles, Crompton, Wood, Furbush, Schaum & Uhlinger, Stafford and Whitin looms.—Knock-off motions.—Fast and loose reeds.—Harness and box chain building and care of stock.—Multiplier box chain building.—Production of fabrics for men's and women's wear, draperies, carpets, etc., from cotton, wool, worsted, silk and linen, on the latest and best looms made.

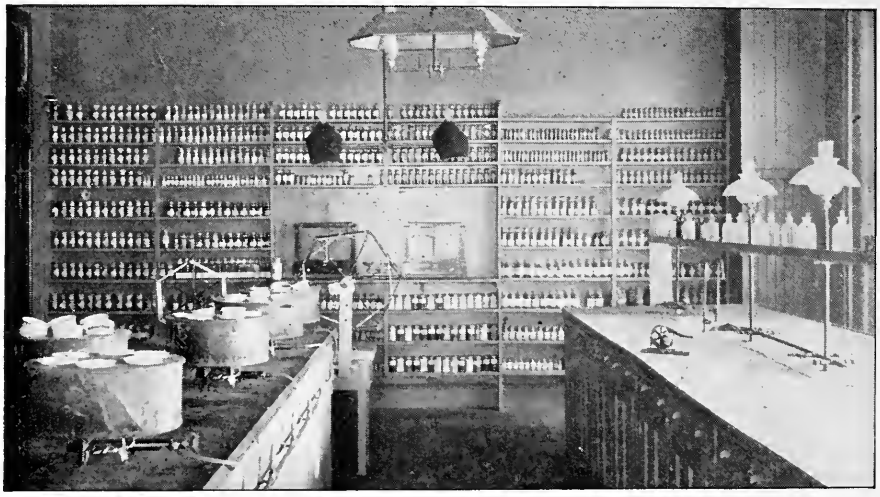
NOTE.—The fabrics produced by each student are from his own designs and from yarns dyed by the students. He performs all the operations of warping, beaming, drawing-in, reeding, placing in the loom, chain building and weaving.

CHEMISTRY.

Physical structure and chemical composition of silk fibre.—Behavior under chemical reactions.—Chemistry of stripping, boiling off and bleaching of silk.—Detection of impurities in silk.—Examination for weighting materials and amount of moisture.

DYEING.

Preparation of raw silk, ungumming and boiling off.—Mordanting and weighting—Dyeing fancy colors.—Dyeing blacks on silk.—Bleaching.—Examination of raw and dyed silks.—Application of direct colors to silk.—Dyeing of half-silk goods.—Determination of amount of silk in fabrics.—Treatment of silken noils.



DYEING LABORATORY.

Courses in Chemistry and Dyeing

The course in Chemistry and Dyeing requires two years, and is intended to be an introduction to the practical work of the dyer, and to fit the student to fill the position as chemist in textile establishments. Special attention is paid to the most approved method of color production, and the analysis of chemicals and dyestuffs that are used in textile establishments is taught. The comparative value of dyestuffs and the different methods of determining the same are carefully investigated, and the student is required to attend the lectures and perform laboratory work as well as carry on original research in these lines.

CHEMISTRY I. General Inorganic.

The general properties of matter.—Simple and compound bodies.—Laws of chemical combination.—Elements, atoms and molecules.—The atomic theory.—Chemical calculations.—Preparation, classification and chemical behavior of the chief elements and their compounds, comprising the non-metals and metals, with special reference to those of commercial importance.

This course is elementary, and is carried on by means of lectures and recitations, coupled with considerable laboratory work in experimentation on the properties and preparation of the chemical elements and their compounds.

TEXT-BOOK—Storer and Lindsay's Manual of Chemistry.

REFERENCE BOOKS—Smiths, Richer's Inorganic Chemistry ; Bloxam's Chemistry.

CHEMISTRY II. Qualitative Analysis.

The analytical classification of the metals.—Characteristic tests for the different elements.—Detection of bases and acids in their compounds.—Solving of analytical problems.—Writing of reactions and calculation of results.—Laboratory practice in the manipulation of experiments and the handling of analytical apparatus.

This course is arranged with the view of making the student thoroughly familiar with the characteristic reactions whereby the different chemical elements may be recognized and distinguished from one another in their numerous combinations. This course is carried on largely by experiment, and the student is required to solve problems given to him for analysis. He is taught how to test materials with regard to purity, and the methods of detecting adulterations in the various commercial products with which he is apt to come in contact.

TEXT-BOOK—Newth's Manual of Chemical Analysis.

CHEMISTRY III. Quantitative Analysis.

Use of the balance and other apparatus.—Precipitation, filtration and weighing.—Gravimetric analysis of simple salts and materials used in the manufacture of textiles.—Quantitative separations and determination of the metals.—Volumetric analysis.—Preparation and standardization of solutions.—Use of indicators.—Use and calibration of graduated apparatus.—Acidimetry and alkalimetry.—Calculation of results.

In this course the student learns, by means of actual demonstration, the methods of determining quantitatively the composition of various chemical compounds. He is required to analyze samples of the various commercial products, and to give them their correct valuation in dollars and cents.

TEXT-BOOK—Newth's Manual of Chemical Analysis.

CHEMISTRY IV. Organic Chemistry.

General properties of the compounds of carbon.—Recognition and estimation of carbon, hydrogen, oxygen, nitrogen, the halogens, sulphur and phosphorus in organic bodies.—Calculation of percentage composition and determination of molecular formulæ.—Study of typical compounds; the hydrocarbons, alcohols and acids.—Organic radicals.—The aliphatic and aromatic series.—Benzene and its derivatives.—Phenol and aniline products and dyestuffs.—Anthracene and alizarine products.—The alkaloids.

This course is elementry in character, and is adapted to the needs of the student who is desirous of pursuing further the study of dyestuffs from a chemical point of view. He is made familiar with the names, the composition, and the methods of preparation of the more important compounds of organic chemistry. The analysis and synthesis of a few typical bodies is undertaken with the view of illustrating the methods of building up artificially the numerous derivatives of carbon which find such an extended application in the manufacturing industries.

BOOKS—Wade's Introduction to the Study of Organic Chemistry; Remsen's Organic Chemistry.

CHEMISTRY V. Technical Analysis.

The preparation, properties and analysis of acids and alkalies, bleaching agents, soaps, oils, tannins, mordants and dyestuffs.—Commercial valuation.—Analysis of water and the more important substances used in the technical arts.

This course offers to the student a means of becoming acquainted with chemical technology and the methods of analzying, and the valuation of commercial products. The chemical processes underlying their manufacture and application is carefully studied with reference to the needs of the student himself.

BOOKS—Sadtler's Industrial Organic Chemistry ; Wagner's Chemical Technology ; Thorpe's Outlines of Industrial Chemistry.

CHEMISTRY VI. Coal Tar Colors.

The manufacture of coal gas.—Composition of coal tar.—Fractional distillation.—Isolation and purification of intermediate products.—Manufacture of nitro-benzene, aniline, diphenylamine, the naphthols and napthylamines and other raw materials used in the preparation of the coal tar colors.—The aniline dyes.—The phenol dyestuffs; nitro and azo-bodies.—Oxyazo dyes.—Anthracene derivatives.—New dyes.

This course cannot be pursued before the student has acquired a fair knowledge of organic chemistry. The technology and chemistry of the coal tar colors will be studied in a course of lectures, supplemented by an experimental course in the laboratory, in which the student will have the opportunity of preparing certain of the interemdiate products and dyestuffs. Attention will also be given to the methods of applying the different groups of artificial dyes to the different textile fibres, and of detecting them when dyed on the fibre or otherwise.

BOOKS—Benedixt and Knecht's Chemistry of the Coal Tar Colors ; Nietzki's Chemistry of the Organic Dyestuffs ; Schultze and Julius' Classification of Organic Dyestuffs.

DYEING I. Elementary Wool Dyeing.

Chemical and physical properties of wood fibre.—Action of chemical agents.—Composition of yolk and suint.—Affinity of fibre for colors.—Detection of wool in mixed fabrics.—Bleaching and scouring of loose wool, yarn and cloth.—Water, with special reference to bleaching, scouring and dyeing.—Influence of impurities.—Correction and purification of water.—Mordants and methods of mordanting.—Theories of dyeing.—The natural coloring matters and their application to the fibre.—The artificial dyestuffs; the basic, acid and neutral dyes.—Different methods in their application to the fibre.—The mordant colors.—Assistants and levelling agents.—Practical work in the dyeing of loose wool, yarn and cloth with the various colors and classes of dyestuffs and the compounding of colors.

This course is for the purpose of familiarizing the student with the raw materials used in dyeing, and the application of the dyestuffs and chemicals to the fibres. The lectures are supplemented in this (as in all other courses) by an extensive laboratory practice, illustrative of the methods and materials used in the scouring and dyeing of wool. A constant reference to the chemistry of the subject is made.

BOOKS.—Hummell's Dyeing of Textile Fabrics; Knecht, Rawson and Lowenthal's Manual of Dyeing, Gardner's Wool Dyeing.

DYEING II. Cotton Dyeing.

Chemical and physical nature of the fibre.—Natural impurities.—Behavior of the fibre with chemical agents.—Mercerized cotton.—Oxycellulose and artificial silk.—Mordants; the preparation, properties and application of the various chemicals used in mordanting cottons.—Tannin and oil mordants.—The natural and artificial coloring matters and their application to cotton.—The direct cotton colors.—Scouring and bleaching of cotton.—Practical work in the dyeing of loose cotton, yarn and cloth with the various dyestuffs.

This course is similar to that given under wool dyeing, and is chiefly experimental in nature, whereby the student becomes familiar with the application of mordants and dyestuffs to the cotton fibre.

BOOKS—Hummell's Dyeing of Textile Fabrics; Duerr's Bleaching and Calico Printing.

DYEING III. Advanced Course.

Advanced methods of scouring, carbonizing and dyeing.—Matching shades on yarns and fabrics.—Indigo vat dyeing.—Turkey red.—Alizarine shade matching.—Aniline black.—Silk dyeing; study of the fibre and the action of chemicals and dyestuffs.—Machinery used in the various processes of dyeing, scouring and bleaching

This course is a continuation of those preceding, and instruction is given both by means of lectures and experimental work in the dye-house.

DYEING IV. Testing and Valuation of Dyestuffs.

Testing colors as to permanence against the action of light, scouring and fulling, determination of commercial values of dyewares, mordants, bleaching agents, scouring agents, etc.—Purification of spent liquors and recovery of waste products.—Detection of dyestuffs on fibres and otherwise.—Detection of the different fibres in mixed goods.

In this course the student is given some idea of commercial testing for the comparative value and strength of dyestuffs and fibres. He learns how to detect and estimate impurities and adulterations.

Course in Ingrain Carpet

Explanation of the structure of the fabric.—Selection of designing paper for the different grades, such as fine, superfine and extra-super.—The various weaves commonly used, and painting of effects produced by them, in color, as used in warp and filling.—Modification of the Jacquard machine for the production of ingrain carpets.—Substitution of trap-boards and tail-cords for hooks and griffe-bars.—Working of the journals in connection with the machine.—Tying up the harness.—Cross point and centre ties.—Arrangement of the lashes in the journals.

Lectures on Patent Law

The age of progress through which we are now passing stimulates every thinking man to seek out methods of facilitating the processes of industry in general. This is particularly true of the textile industries, which have in the past half century undergone almost incredible changes, and are to-day being improved beyond all expectation. These improvements call for the protection of the patent laws of this and other countries ; and the manufacturer who would be successful must have some knowledge of the methods of acquiring these rights and of the laws governing them. The success which attended these lectures during the past year has prompted us to repeat them during the coming season. Some of the points to be covered are as follows : Origin, growth and advancement of the patent system.—Manner of obtaining a patent right.—Descriptions, claims, models and drawings.—Patentable articles.—Infringements.—Application of patent rights to textile fabrics.—Application of patent rights to textile machinery. —Discussion of various existing patents as to their legality.—Comparison of the patent laws of the United States with those of foreign countries.

LECTURE ROOM—CHEMISTRY AND DYEING.

Evening School

Courses of Study

The following are the regular courses, and they are recommended as advantageous outlines of study. The fee for any one of these courses with the exception of the Technical Analysis in Course G (see page 72) is $15.00 for the year or term. If, however, a person does not desire to follow any of these courses, preferring to confine his attention to certain of the subjects which are given on page 74, he may do so in accordance with the schedule shown on page 73.

NOTE.—In these courses, as in all others taught in the Evening School, the aim is to cover in a general way what is given in the Day Classes. The shortness of the time, however, renders it impossible to treat exhaustively any particular branch, and it is expected that the instruction given in the Classes will be supplemented by a considerable amount of home study.

(Hours, 7.30 to 9.30, on evenings as noted below.)

Course A

	MONDAY.	WEDNESDAY.	FRIDAY.
First year.	Elementary Weave Formation and Fabric Structure.	Woolen Yarn Manufacture.	Elementary Calculations. Fabric Analysis and Weaving.
Second year.	Intermediate Calculations. Fabric Analysis and Study of the Power Loom.	Intermediate Weave Formation and Fabric Structure.	Cotton Yarn Manufacture.
Third year.	Wool Selecting, Grading, Sorting and Blending.	Advanced Calculations. Fabric Analysis. Study of the Power Loom.	Advanced Weave Formation and Fabric Structure.

Course B

	MONDAY.	WEDNESDAY.	FRIDAY.
First year.	Elementary Weave Formation and Fabric Structure.	Woolen Yarn Manufacture.	Elementary Jacquard Design.
Second year.	Advanced Jacquard Design.	Intermediate Weave Formation and Fabric Structure.	Cotton Yarn Manufacture.
Third year.	Advanced Jacquard Design.	Advanced Jacquard Design.	Advanced Weave Formation and Fabric Structure.

Course C

	MONDAY.	WEDNESDAY.	FRIDAY.
First Year.	Elementary Weave Formation and Fabric Structure.	Woolen Yarn Manufacture.	Elementary Calculations, Fabric Analysis and Weaving.
Second Year.	Intermediate Calculations, Fabric Analysis and Study of the Power Loom.	Intermediate Weave Formation and Fabric Structure.	Worsted Yarn Manufacture.
Third Year.	Wool Selecting, Grading, Sorting and Blending.	Advanced Calculations, Fabric Analysis, and Study of the Power Loom.	Advanced Weave Formation and Fabric Structure.

Course D

	MONDAY.	WEDNESDAY.	FRIDAY.
First year.	Elementary Weave Formation and Fabric Structure.	Elementary Color Harmony.	Elementary Jacquard Design.
Second year.	Advanced Jacquard Design.	Intermediate Weave Formation and Fabric Structure.	Advanced Jacquard Design.
Third year.	Advanced Jacquard Design.	Advanced Jacquard Design.	Advanced Weave Formation and Fabric Structure.

Course E

	MONDAY.	WEDNESDAY.	FRIDAY.
First year.	Elementary Weave Formation and Fabric Structure.	Elementary Color Harmony.	Elementary Calculations. Fabric Analysis and Weaving.
Second year.	Intermediate Calculations. Fabric Analysis, and the Study of the Power Loom.	Intermediate Weave Formation and Fabric Structure.	Elementary Jacquard Design.
Third year.	Advanced Jacquard Design.	Advanced Calculations. Fabric Analysis, and the Study of the Power Loom.	Advanced Weave Formation and Fabric Structure.

Course F

	MONDAY.	WEDNESDAY.	FRIDAY.
First year.	Elementary Dyeing.	Chemistry Lecture.	Elementary Dyeing.
Second year.	Intermediate Dyeing.	Intermediate Dyeing.	Intermediate Dyeing.
Third year.	Advanced Dyeing.	Advanced Dyeing.	Advanced Dyeing.

Course G

	MONDAY.	WEDNESDAY.	FRIDAY.
First year.	Elementary Chemistry Lecture and Laboratory Practice.	Elementary Laboratory Practice.	Elementary Laboratory Practice.
Second year.	Intermediate Chemistry Lecture and Laboratory Practice.	Intermediate Laboratory Practice.	Intermediate Laboratory Practice.
Third year.	Advanced Chemistry Lecture and Laboratory Practice.	Advanced Laboratory Practice.	Advanced Laboratory Practice.

Evening School Schedule

SHOWING THE EVENINGS ON WHICH ARE TAUGHT THE SUBJECTS STATED ON PAGE 74.

MONDAY.	WEDNESDAY.	FRIDAY.
Elementary Weave Formation and Fabric Structure.	Intermediate Weave Formation and Fabric Structure.	Advanced Weave Formation and Fabric Structure.
Intermediate Calculations, Fabric Analysis and Study of the Power Loom.	Advanced Calculations, Fabric Analysis and Study of the Power Loom.	Elementary Calculations, Fabric Analysis and Weaving.
Advanced Jacquard Design.	Advanced Jacquard Design.	Advanced Jacquard Design.
Wool Selecting, Grading, Sorting and Blending.	Woolen Yarn Manufacture.	Cotton Yarn Manufacture.
	Color Harmony.	Elementary Jacquard Design.
Elementary and Advanced Chemistry.	Elementary and Advanced Chemistry.	Elementary and Advanced Chemistry.
Dyeing.	7.30 to 8.30 Chemistry Lecture. | 8.30 to 9.30 *Finishing Lecture.	Dyeing.

*From January 3d to March 28th.

Subjects of Study and Fees

Evening Classes

WEAVE FORMATION.

Divided into Elementary, Intermediate and Advanced, each division requiring one year. For details see pages 38, 42, 46. Fee for this subject, two hours per week for the term, $6.00.

ELEMENTARY WEAVING, CALCULATIONS AND FABRIC ANALYSIS.

Requiring one year. For details see pages 39 and 41. Fee for this subject, two hours per week for the term, $6.00.

INTERMEDIATE AND ADVANCED CALCULATIONS, FABRIC ANALYSIS AND STUDY OF THE POWER LOOM.

Each division requiring one year. For details see pages 42, 44, 46. Two hours per week for the term, $6.00.

COTTON SPINNING.

One year is required. For details see page 50. Fee for this subject, two hours per week for the term, $6.00.

WOOL SPINNING.

One year is required. For details see page 55. Fee for this subject, two hours per week for the term, $6.00.

WORSTED SPINNING.

One year is required. For details see page 56. Fee for this subject, two hours per week, $6.00.

CHEMISTRY.

Elementary Chemistry, including laboratory work and lectures, requires one year together. Fee for this subject, six hours per week for the term, $15.00. General Analysis and Technical Chemistry each requires one year. Fees for these subjects, six hours per week for the term, $25.00. For details see page 64. "Deposits," page 33.

DYEING.

Elementary Dyeing and Chemistry Lectures require one year together. Fee for this subject, five hours per week for the term, $15.00. Intermediate and Advanced Dyeing each requires one year. Fee for these subjects, six hours per week for the term, $15.00. For details see pages 45-48. "Deposits," page 33.

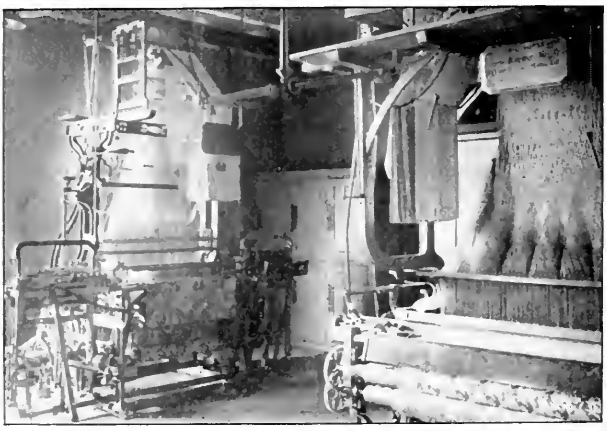
COLOR HARMONY.

Divided into Elementary and Advanced, requiring one year for each. This class is conducted for the benefit of students who desire to qualify themselves for positions as colorists and similar occupations where a knowledge of the principles of color harmony is essential. A thorough explanation of the theory of color is entered into, each student painting a set of color scales and designs illustrating the principles laid down. The work of the class also includes the study of color harmony with the actual yarn, the student beginning with simple combinations of color and going on to advanced work. Fee for this subject, two hours per week for the term, $6.00.

JACQUARD DESIGN.

Divided into Elementary and Advanced. The former subject includes instruction in the principles of the Jacquard machine. Tying-up and threading the

comberboard, as well as work in design and card stamping. One year is required. The advanced work is intended for those who are already familiar with the elementary work, through outside experience or owing to having taken it in the school, and whose ambition it is to fit themselves for positions in which greater skill is demanded. It requires two years, which are devoted to higher Jacquard design and card stamping. Fee for these subjects, two hours per week for the term, $6.00.



A JACQUARD CORNER IN MAIN POWER WEAVE ROOM.

WOOL SELECTION, GRADING AND BLENDING.

Instruction in this subject is given by means of lectures, which occur weekly on Monday evenings. The year's work is divided into two portions designated as elementary and advanced, and includes the discussion of such topics as "The Nature and Peculiarities of the Wool Fibre;" "Comparison of Different Wools;" "Varieties and Uses of Wool Substitutes;" "Grading and Sorting of Fleeces;" "The Selection of Wool;" "Calculations on Mixing;" "Cost Calculations for Mixings;" "Shrinkage," etc. Fee for this subject, one and one-half hours per week, $6.00.

FINISHING.

There will be given during the coming term, beginning with January 3, 1900, and continuing each Wednesday evening until March 28th, lectures on the various methods, styles and finish of worsted and woolen cloths. During the first half of the course the subjects as outlined on page 46 will be carefully treated. Students of the Second Year Regular Day Course are expected to attend these lectures. The latter part of the course will embrace such subjects as are outlined on page 48, and students of the Third Year Regular Day Course are expected to attend these lectures as a part of their course of study. The practical work of finishing of the various fabrics produced in the School is performed by the students of the advanced classes under competent instructors on Saturday afternoons during the latter part of the year. For those not enrolled as pupils in the above classes the fee for these subjects, one hour per week, from January 3rd to the end of course or term, $3.00.

Donations

To the Institution During the Past Year

LOWELL MACHINE SHOP, Lowell, Mass.—One Coiler Gill Box, one Double Can Gill Box, one Two Spindle Gill Box, two Two Spindle Drawing Boxes, one Four Spindle Weigh Box, one Eight Spindle Finisher, one Twenty-four Spindle Reducer, one Thirty Spindle Dandy Rover, two Seventy-two Spindle Cap Spinning Frames; also a full complement of Change Gears for the above machines.

ALEXANDER BROS., Philadelphia, Pa.—All the necessary Double Belting of various widths (specially made) for new Worsted Branch, to the value of $235.00.

L. SPRAGUE CO., Lawrence, Mass.—Spools and bobbins for use in Worsted Department, to the amount of $58.29.

MESSRS. SCHAUM & UHLINGER, Philadelphia, Pa.—One six space Circular Batten Lay to replace the one received with the loom.

CROMPTON & KNOWLES LOOM WORKS, Worcester, Mass. Extra attachment for Shedding Motion on Knowles Gem Loom.

WHITIN MACHINE WORKS, Whitinsville, Mass.—Forty Whitin Locking Saddles and Stirrups for Whitin Spinning Frame.

MITCHELL, BISSEL & CO., New York—Two and one-half gross Enameled Twister Guides; also two gross Enameled Spinning Guides.

HON. PHILIP C. GARRETT, Philadelphia, Pa.—A model of Navahoe Loom.

D. TRAINER & SONS MFG. CO., Trainer, Pa.—One hundred and ten pounds of 2-20 Skein Yarn, eighteen pounds 1-20 Skein Yarn and seven pounds 1-10 Skein Yarn.

SOUTHWARK MILLS CO., Philadelphia, Pa.—Fifty pounds XX Ohio Scoured Wool.

MR. H. T. WHITIN, Northbridge, Mass.—Twenty-one pounds of fine Cotton Yarn; also a variety of samples of fancy Fabrics.

ABERFOYLE MFG. CO., Chester, Pa.—Five pounds of Mercerized Cotton; five pounds of bleached Single 40's Cotton; also two bundles of Cloth Samples.

SAUQUOIT SILK MFG. CO., Philadelphia, Pa.—Four pounds fifteen ounces of Italian Silk; also full width samples of broad Silks of their manufacture.

CHAMPLAIN SILK MILLS, New York—Six pounds 60-2 ply Silk.

GEO. CAMPBELL & CO., Philadelphia, Pa.—One hundred and sixty-five pounds of Card Fly.

MR. B. R. DOVER, Philadelphia, Pa.—Two hundred Quills for Silk Ribbon Loom.

PATERSON REED AND HARNESS CO., Paterson, N. J.—Six fine Reeds for narrow fabrics.

BINNS' PATENT BAND CO., Philadelphia, Pa.—Fifty Twister Bands for Collins Frame.

MR. CHARLES BOND, Philadelphia, Pa.—One bundle Belt Lacing.

JOHN STORY JENKS, Philadelphia, Pa.—One dozen additional cases for displaying Cotton Samples.

ATLAS MFG. CO., Newark, N. J.—One case of Wool Samples scoured by the Peckham Wool Washing System.

MR. S. B. SOLOMON, New York.—Valuable piece of Tapestry, illustrating the landing of Columbus; also Collection of Pictorial Tapestries used for chair backs, screens, etc.

MESSRS. HUGHES & MUELLER, Philadelphia, Pa.—Blanket Range of Woolen Samples.

MILLVILLE MFG. CO., Millville, N. J.—Fifty-two yards of plain grey goods.

MISS MARY ATHERTON LEACH, Philadelphia, Pa.—Samples of Draperies.

GEO. A. CLARK & BRO., New York.—Specimen Case showing process of thread manufacture.

C. MOORE & CO., Philadelphia, Pa.—Lacing Cords, Loom Rope and Jacquard Twines to the value of $13.25.

WM. J. MATHESON & CO., Philadelphia, Pa.—Forty-five pounds of Dyestuffs, twenty-eight four ounce bottles of Dyestuffs and Sample Books.

FARBENFABRIKEN OF ELBERFELD CO., New York.—Fifteen pounds of Dyestuff, one hundred and three two ounce bottles of Dyestuffs, twelve four ounce bottles of Dyestuffs and four large Sample Cards.

HANNA-SCHOELLKOPF CO., Philadelphia, Pa.—Fifteen pounds of Dyestuffs, thirty-four four ounce bottles of Dyestuffs, ninety-two two ounce bottles of Dyestuffs and Sample Books.

SYKES & STREET, Philadelphia, Pa.—Twenty-one pounds of Dyestuffs, twenty-six four ounce bottles of Dyestuffs, and one keg Sumac Extract (Stainless).

NEW YORK AND BOSTON DYEWOOD CO., New York.—Two pounds of Dyestuff, seventy-three four ounce bottles of Dyestuffs, three two ounce bottles of Dyestuffs; also Sample Cards.

PICKHARDT & KUTTROFF, Philadelphia, Pa.—Thirteen pounds of Dyestuffs, sixty-seven four ounce bottles of Dyestuffs and nine one ounce samples of Dystuffs.

ROESSLER & HASSLACHER CHEMICAL CO., New York. Twenty-six pounds Sodium Peroxide; also fifty books on Bleaching.

O. S. JANNEY & CO., Philadelphia, Pa.—One hundred pounds of Bichrome, two pounds of Indigo, two pounds Cochineal, one pound Dyestuff.

READ HOLLIDAY & SONS, Philadelphia, Pa.—Twenty-three four ounce bottles of Dyestuffs.

QUAKER CITY CHEMICAL CO., Wayne Junction, Pa.—Ten pounds each of "A" and "B" grades of Glugloss Gelatine.

J. A. & W. BIRD & CO., New York.—Two pounds of Dyestuffs.

VICTOR KOECHL & CO., New York.—Fourteen one ounce bottles Janus Colors; also Sample Cards.

A. KLIPSTEIN & CO., Philadelphia, Pa.—Twenty-three two ounce bottles of Dyestuffs.

COLLINS & AIKMAN CO., Manayunk, Pa.—Quantity of Cotton Plush.

J. R. MONTGOMERY CO., Windsor Locks, Conn.—Samples of Mercerized Yarns.

EICHMANN & STERNBERG, New York.—Samples of Mercerized Yarns.

EDWARD JEFFERSON & BRO.—All the necessary Leather Aprons for the gill boxes in new Worsted Branch.

FARBWERK MÜHLHEIM, Germany—Two Sample Books.

Courtesies Extended

Edmund J. Walenta, Philadelphia, Pa.—I. J. R. Muurling, President of Farbenfabriken of Elberfeld Co., New York.—F. H. Higgins, New York.—Peter Sharp, New York.—Schaum & Uhlinger, Philadelphia, Pa.—Farbenfabriken of Elberfeld Co., New York.—Stoddard, Haserick, Richards & Co., Boston, Mass.—S. N. D. North, Boston, Mass.—Erben, Harding & Co., Philadelphia, Pa.—Draper Co., Hopedale, Mass.—Albert Hellwig & Co., Philadelphia, Pa.—Keystone Spinning Mills Co., Philadelphia, Pa.—John Lunn, Philadelphia, Pa.—Fales & Jenks, Pawtucket, R. I.—Jacob Miller, Sons &Co., Borich Mills, Philadelphia, Pa.—John & James Dobson, Bradford Mills, Germantown, Philadelphia, Pa.—Folwell, Bro. & Co., Philadelphia, Pa.—Geo. C. Hetzel & Co., Chester, Pa.—Howland Croft, Sons & Co., Camden, N. J.—Millville Mfg. Co., Millville, N. J.—Samuel A. Crozer & Son, Upland, Pa.—Aberfoyle Mfg. Co., Chester, Pa.—Firth & Foster Co., Philadelphia, Pa.—Thomas Field, of Young, Smyth, Field & Co., Philadelphia, Pa.—Beswick & Kay, Philadelphia, Pa.—H. J. Maynard, Philadelphia, Pa.—Sauquoit Silk Mills, Philadelphia, Pa.—Southwark Mills Co., Philadelphia, Pa.—H. B. Farrell, Philadelphia, Pa.—Wm. Emsley & Bro., Philadelphia, Pa.—Alexander Crow, Philadelphia, Pa.—The J. B. Stetson, Co., Philadelphia, Pa.

A Partial List of Former Students of the School with their Occupations

(Pupils are requested to assist the Principal in correcting the List.)

ADOLPHSON, LOUISE, Teacher of Drawing, Philadelphia.
ALDRICH, W. S., Instructor in Drawing, Johns Hopkins University.
ALGEO, BRADLEY C., Assistant Director Philadelphia Textile School.
ALLEN, FRANKLIN, Designer, Boote Manufacturing Co., Lowell, Mass.
ALSOP, RACHEL G., Teacher of Drawing, Friends' Select School, 16th and Race Streets, Philadelphia.
APPLEYARD, W. S., Prop. Jamestown Tapestry Mills, Jamestown, N. Y.
ALTHOEN, HARRY, Designer, American Suspender Co., Waterbury, Conn.
ARMSTRONG, HERBERT, Designer, James Lees & Sons Co., Bridgeport, Pa.
ASPDEN, NEWTON, Designer, with John Williams Manufacturing Co., Philadelphia.
ADAMS, G. E., Gilsum Manufacturing Co., Gilsum, N. H.
ARMSTRONG, WM. E., Chemist, Arnold Print Works, North Adams, Mass.
ANDERSON, CARL T., Illustrator, New York.
AHRENS, HERMAN, Arlington Mills, Wilmington, Del.
ANDREAE, F. W., with C. Andreae & Sons, Yale, Mich.
ADAMS, W. W., Dyer, Philadelphia.
ADAMS, F. W., Designer, Bridgeport, Pa.
BALDERSTON, ANNE, Illustrator, Philadelphia.
BAILEY, VERNON HOWE, Designer, Boston Engraving Co., Boston.
BARR, WILLIAM, Dyestuff Salesman, Davis & Walten.
BATES, WILLIAM H., Designer, Philadelphia.
BEATTY, JOHN R., Woolen and Cotton Manufacturer, Philadelphia.
BECK, ROBERT K., Designer, Philadelphia.
BERG, KATE DE W., Director of Art Dept., Bennett Pottery Co., Baltimore.
BEYER, ALBERT, Designer, with Barnes & Beyer.
BILSON, C. R., Designer and Decorator, Philadelphia.
BIRD, CLINTON H., Woolen Manufacturer, Bethlehem, Conn.
BISSEGGER, J. J., Draughtsman, with E. V. Seeler, Philadelphia.
BLACK, W. A., Designer, Carey Bros., Philadelphia.
BOND, W. E., Designer, Nashawanuck Mills, East Hampton, Mass.
BREADY, EDWIN K., Dress Goods Manufacturer, Philadelphia.
BROWIN, HARRY, Dyer, with Lotte & Mazeres.
BRIDGE, SAMUEL, Designer, Owoneco Silk Co., Norwich, Conn.
BRINTON, ANNIE H., Decorator, Edwin Bennett Pottery Co., Baltimore.
BROOKS, JAMES E., Chemist, Southwark Mills Co., Philadelphia.
BROOM, HARRY, Overseer, Firth & Foster Bros., Philadelphia.
BROWN, E. H., Yarn Manufacturer, with Wilson H. Brown & Bro., Germantown.
BROWN, F. G., Dyestuff Salesman, with Stamford Manufacturing Co.
BURT, JOHN, Superintendent, Southwark Mills Co., Philadelphia.
BUTTERWORTH, SAMUEL, Superintendent Borich Mills, Philadelphia.

BANES, R. C., Philadelphia.
BOND, CHARLES, Mill Supplies, Philadelphia.
BLACKWOOD, WILLIAM, Designer, Bradford Mills, Philadelphia.
BRIGHT, A. T., with Worral & Taylor Manufacturing Co., Bridgeport, Pa.
BUTTERWORTH, GEORGE, Public Warp Beamer, Philadelphia.
BICKHAM, S. A., with Aberfoyle Manufacturing Co., Chester, Pa.
BLOUNTZ, JOHN, Beamer, Philadelphia.
BLUM, H. L., with Blum Bros., Silk Dyers, Paterson, N. J.
BUTTERWORTH, ALBERT, Beamer, with F. A. Bochmann & Co., Phila.
BISSETT, WILLIAM, Loom Fixer, Bradbury Bros., Philadelphia.
BARLOW, H. E., with Noah Barlow Tapestry Mills, Philadelphia.
BARNETT, THOMAS, Head Beamer, C. J. Milne Co., Philadelphia.
BOOTH, JAMES, with American Card Clothing Co., Worcester, Mass.
BAKER, WILLIAM, Aberfoyle Manufacturing Co., Chester, Pa.
BRADLEY, ISABELLA, Teacher of Drawing, Pennsylvania Museum, School of Industrial Art.
BACHMAN, H. E., Ivory Carver, Philadelphia.
BENNETT, FRED. W., Metal Worker, Philadelphia.
BAUER, CHARLES J., Wood Carver, Philadelphia.
BELOTTI, SALVADOR, Architectural Modeller, Philadelphia.
BOYER, LYNN H., Commercial Draughtsman, Philadelphia.
BUHLER, J., Photo Engraver, Philadelphia.
BASSETT, GEORGE C., Architect, Philadelphia.
BETELLE, J. OSCAR, Architectural Draughtsman, Philadelphia.
BONSALL, MARY W., Illustrator, Philadelphia.
BURTON, ALFRED, Illustrator, Curtis Publishing Co., Philadelphia.
BURYHOF, CHARLES, Decorator, Philadelphia.
BECKER, CHARLES, Steel Engraver, Philadelphia.
BOEHLKE, EMIL, Photo Engraver, Philadelphia.
BOSWORTH, H. H., with Cedartown Mfg. Co., Cedartown, Ga.
BOSWORTH, F. M., with Philadelphia Tapestry Co., Philadelphia.
BENTON, S. IRVING, Farbenfabriken of Elberfeld Co.
CAMPBELL, ARCHIE, Head Dyer, Ivins, Dietz & Metzger, Philadelphia.
CAMPBELL, J. ADDISON, Woolen Manufacturer, Manayunk.
CAMPBELL, PETER, Dyeing.
CARROLL, BENJAMIN, Designer, Philadelphia.
CARPENTER, KATE V., Draughtsman, City Survey, Philadelphia.
COCHRAN, JOHN, Commission Merchant, Chicago, Ill.
CONDON, MORRIS G., Overseer, James Doak, Jr., & Co., Philadelphia.
CONNELLY, JOHN, with Aberfoyle Manufacturing Co., Chester, Pa.
CHALK, WILLIAM GEORGE, Designer, Philadelphia.
CHIPMAN, W. E., of Charles Chipman & Sons, Germantown.
CHURCH, MABEL, Teacher of Drawing, Girls' High School, Philadelphia.
COUPE, ALBERT, Overseer and Designer, North Star Woolen Mills, Minneapolis, Minn.
CROWTHER, JOHN, Asst. Supt. Hope Webbing Co., Pawtucket, R. I.
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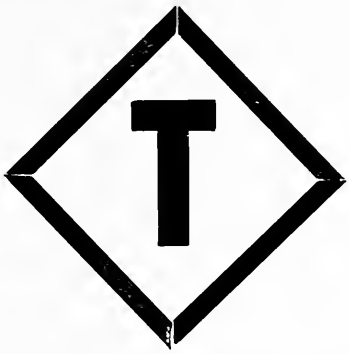

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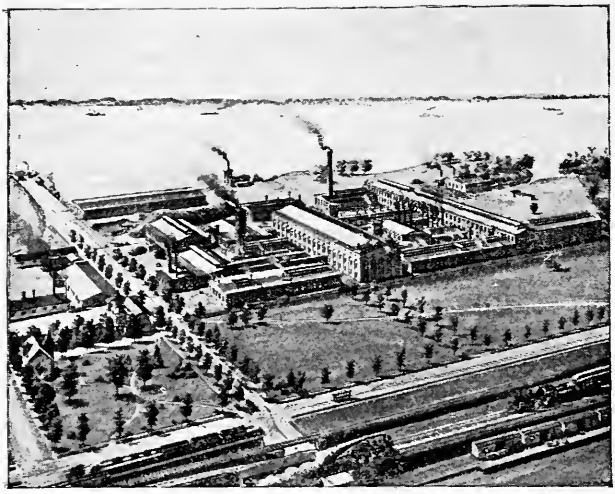

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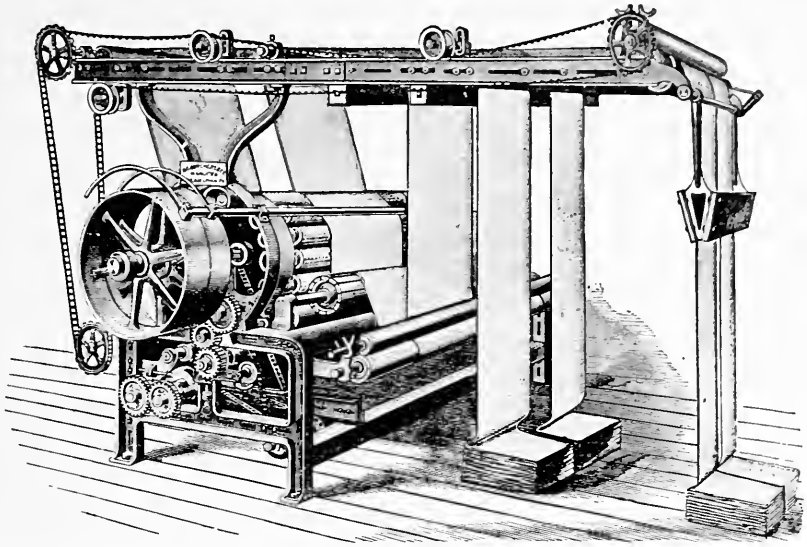

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